

Fig. 1.

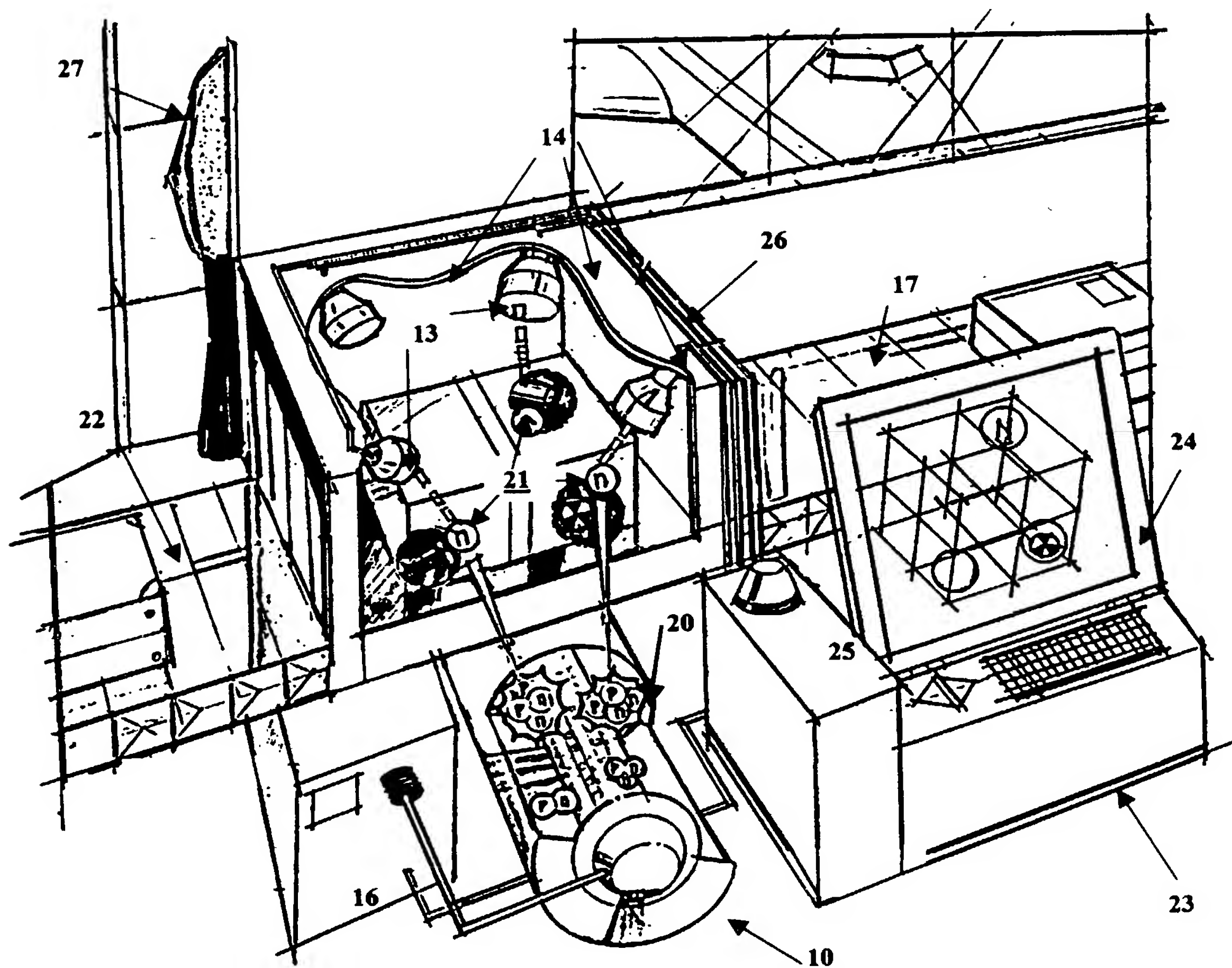
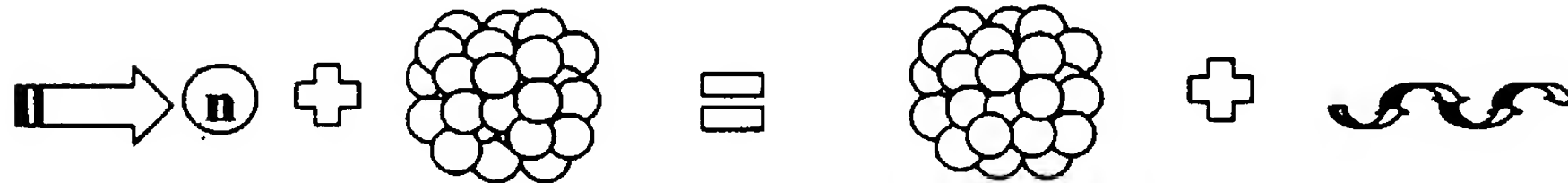


Fig. 2.

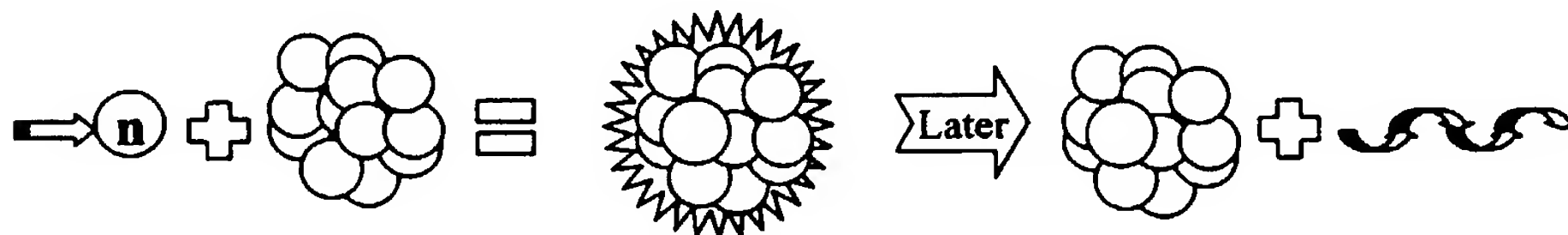
(a) Prompt Gamma Neutron Activation Analysis



Neutron + nucleus = nucleus with extra neutron + characteristic gamma ray

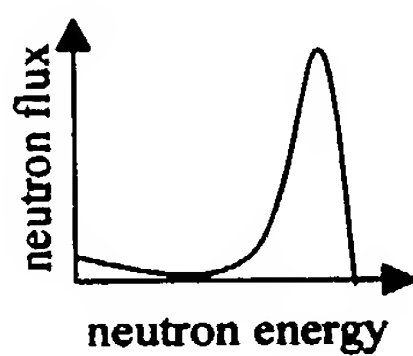
The photon (gamma) that is emitted has a characteristic wavelength (color) that identifies the element.

(b) Delayed Gamma Neutron Activation Analysis



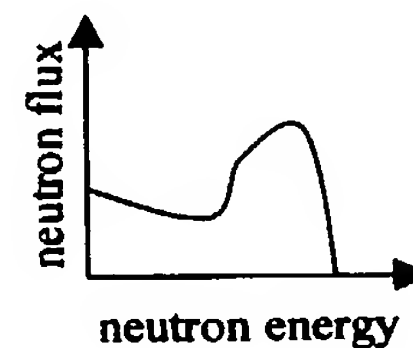
Neutron + nucleus = activated nucleus with extra neutron
 which emits a characteristic gamma ray when it decays

Bulk Material Property Analysis with Neutrons



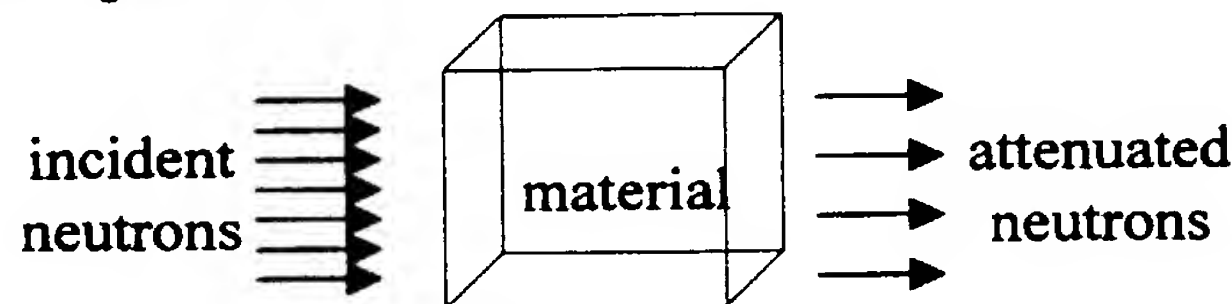
(c) Neutron Energy before Entering Material

(slight energy scattering due to neutrons passing through neutron generator)



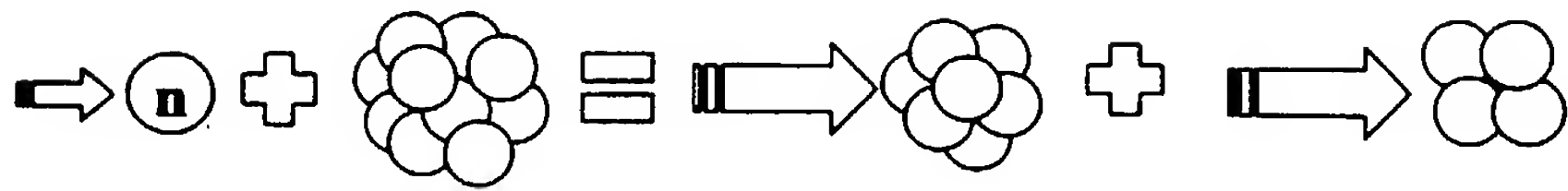
(d) Neutron Energy after Passing through Material

(marked energy scattering due to material properties)



(e) By comparing neutron fluxes before and after passing through the material, various material properties can be calculated, including density, thickness, porosity, and moisture content.

Fig. 3.



Thermal Neutron + Boron-10 = Energetic Lithium-7 + Energetic Alpha

Fig. 4a.

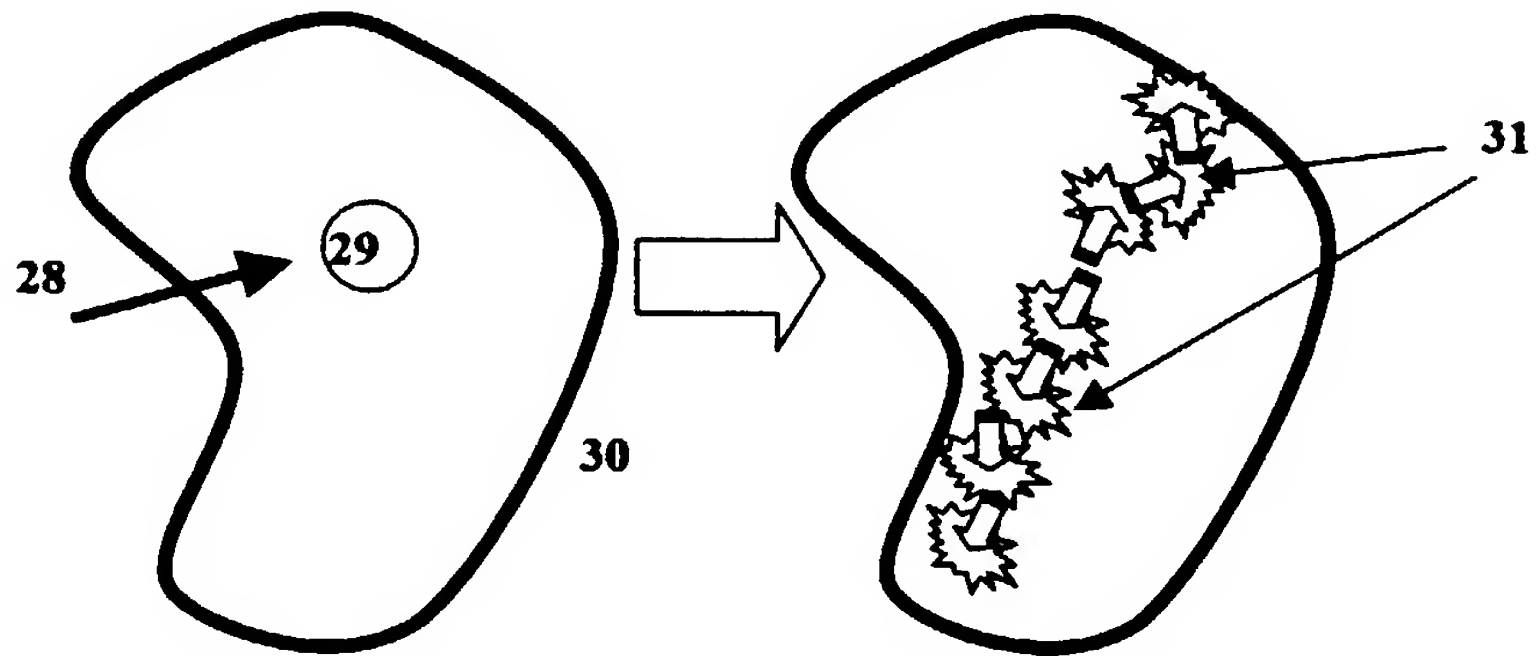


Fig. 4b.

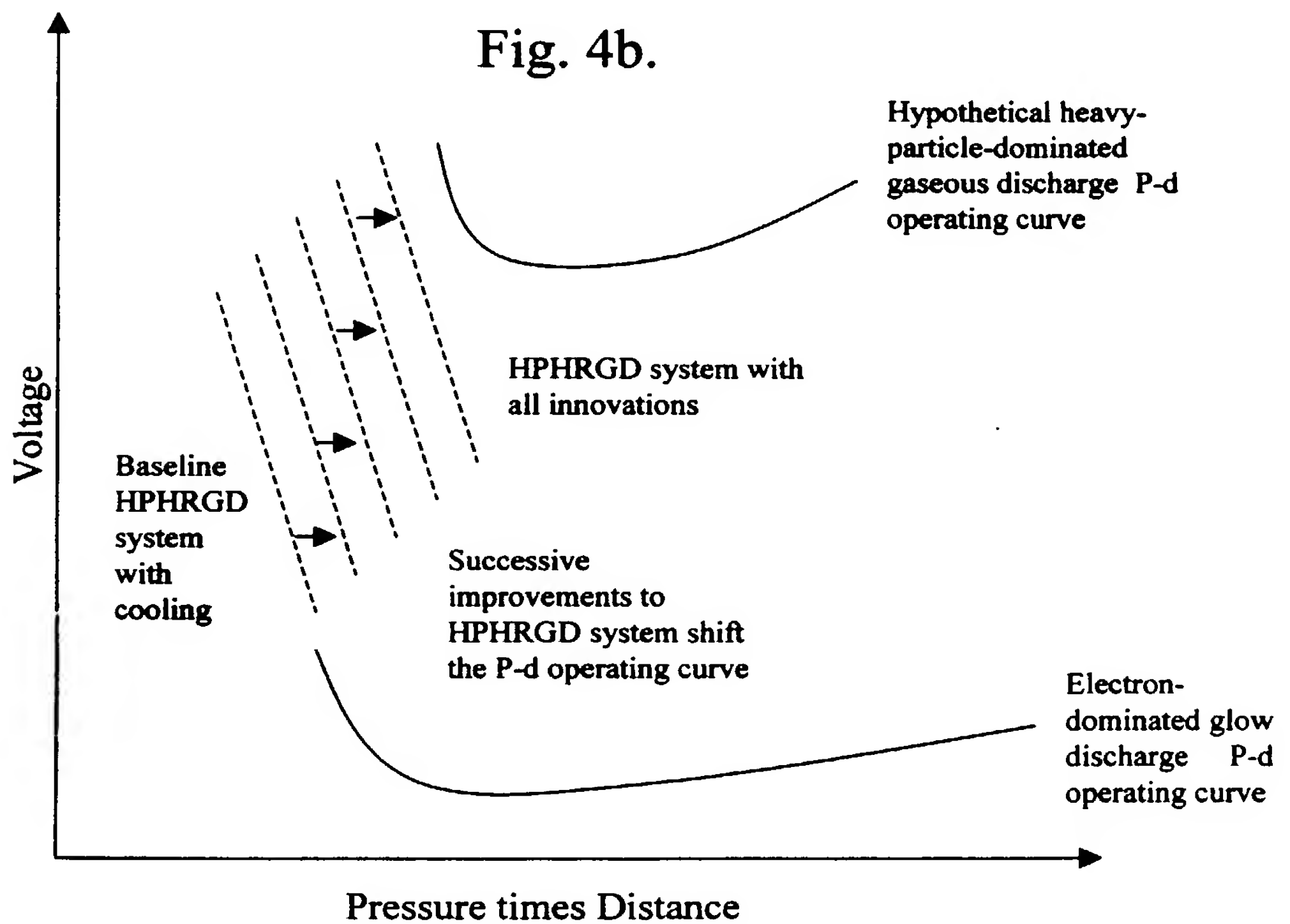


Fig. 5.

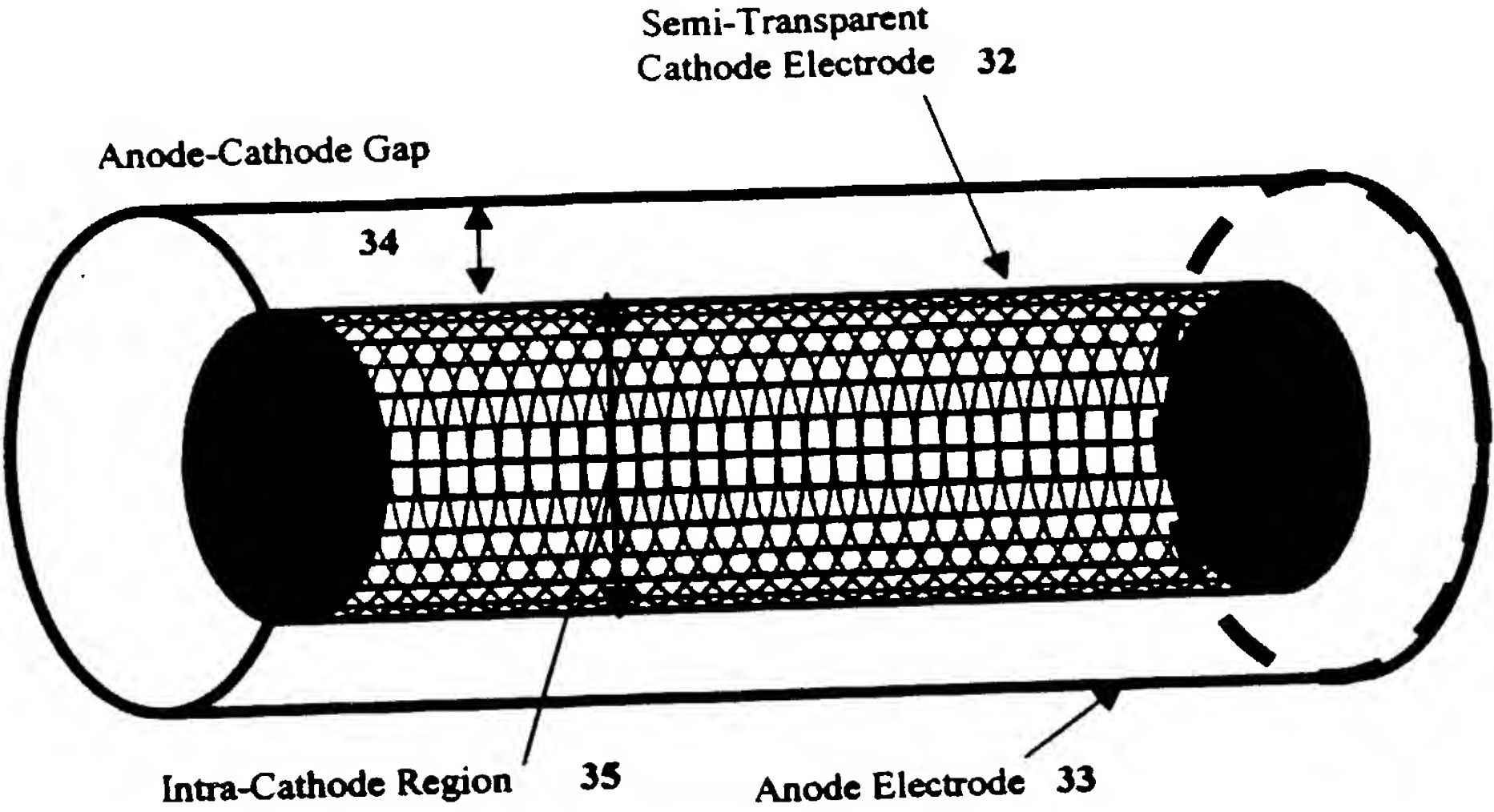


Fig. 6.

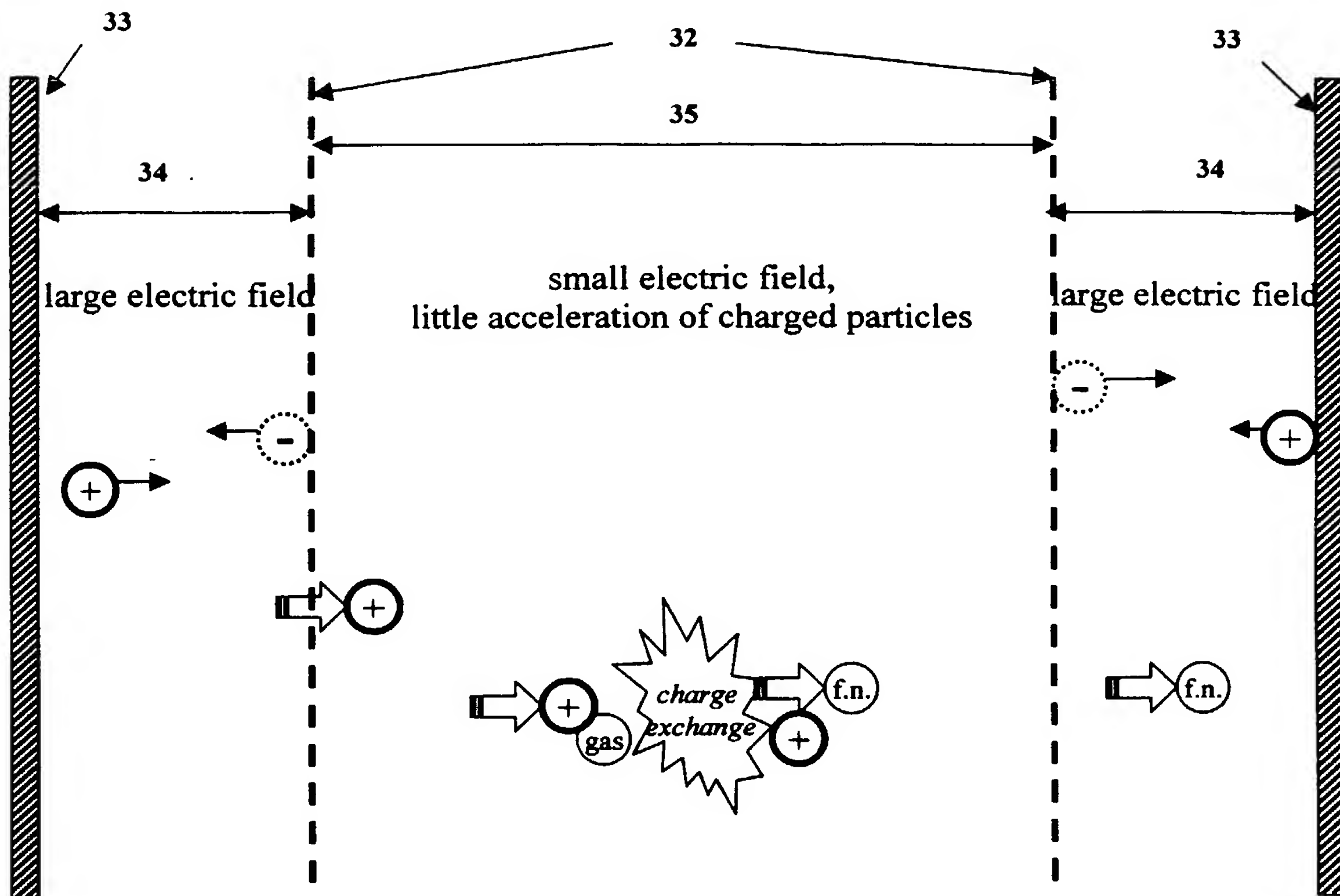


Fig. 7.

Key for Symbols Used in Figures 7, 9, and 33

electron	gaseous discharge particle has energy for collision (above thermal equilibrium)
positive ion (such as deuterium)	collision
fast neutral (such as deuterium)	neutron
background gas (such as deuterium)	helium-3

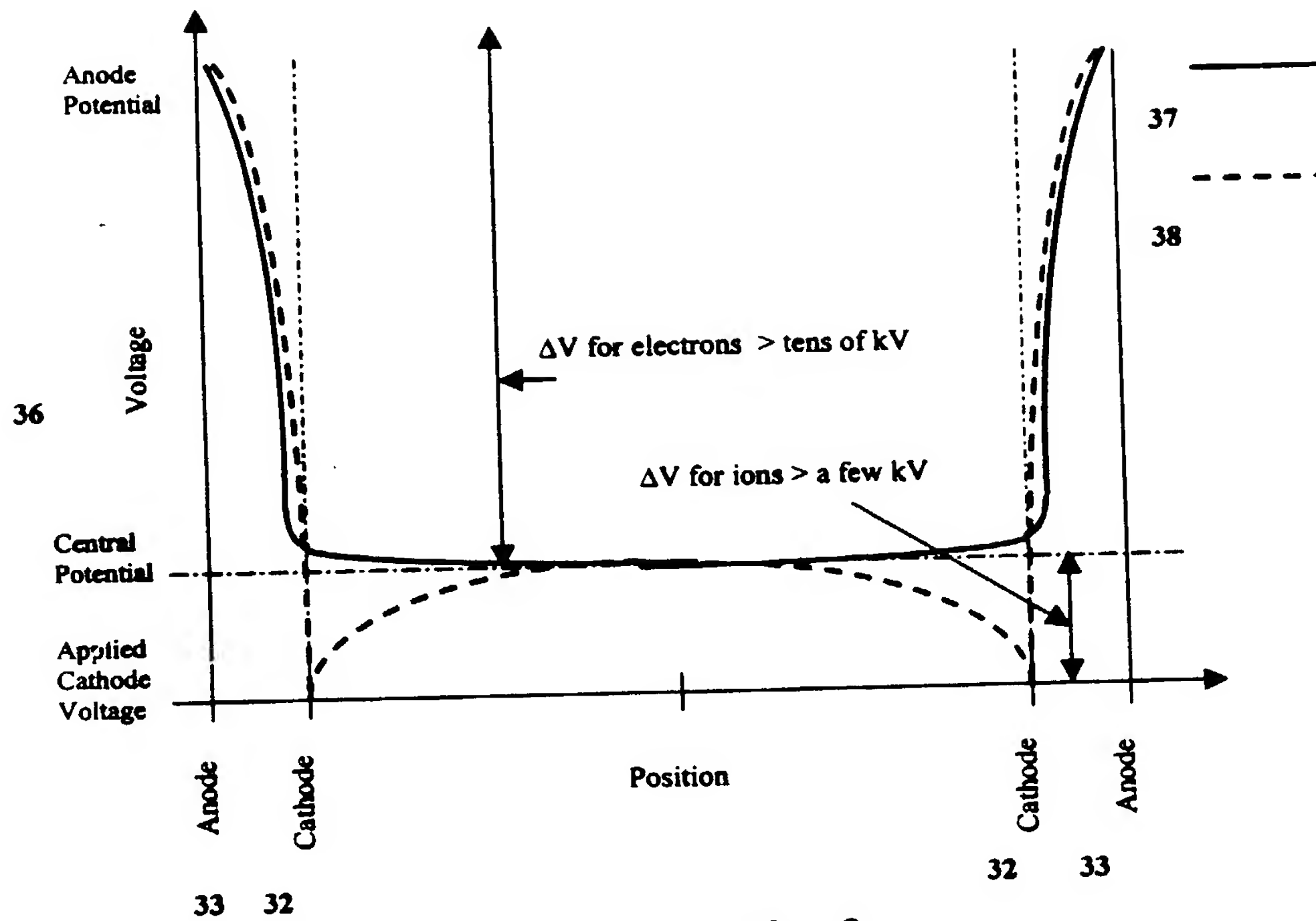


Fig. 8.

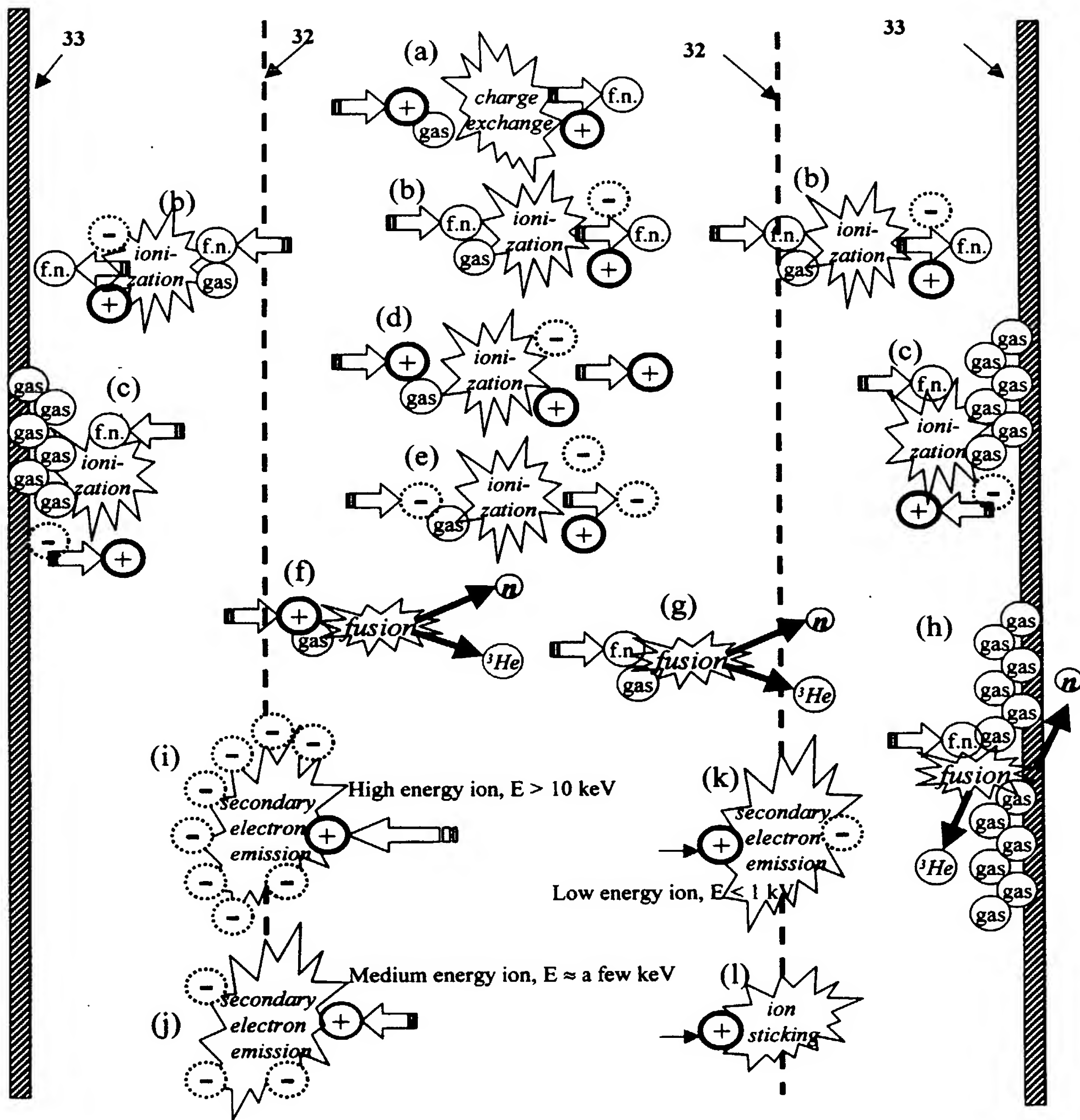


Fig. 9.

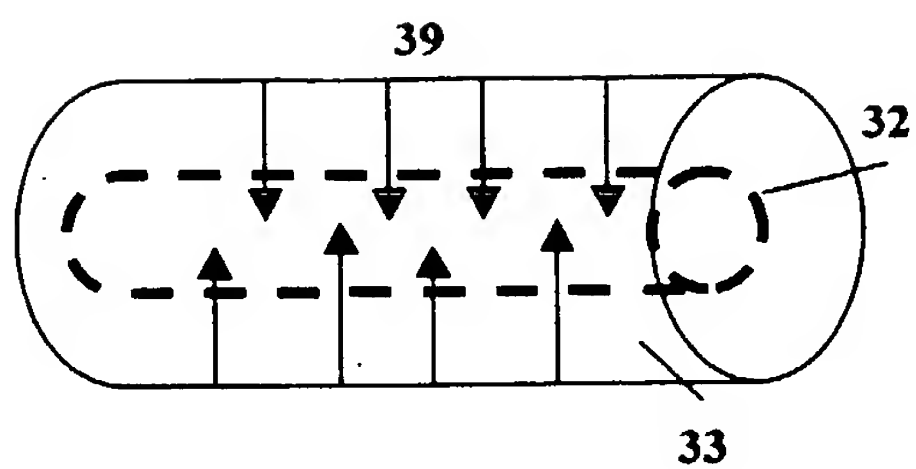


Fig. 10a.

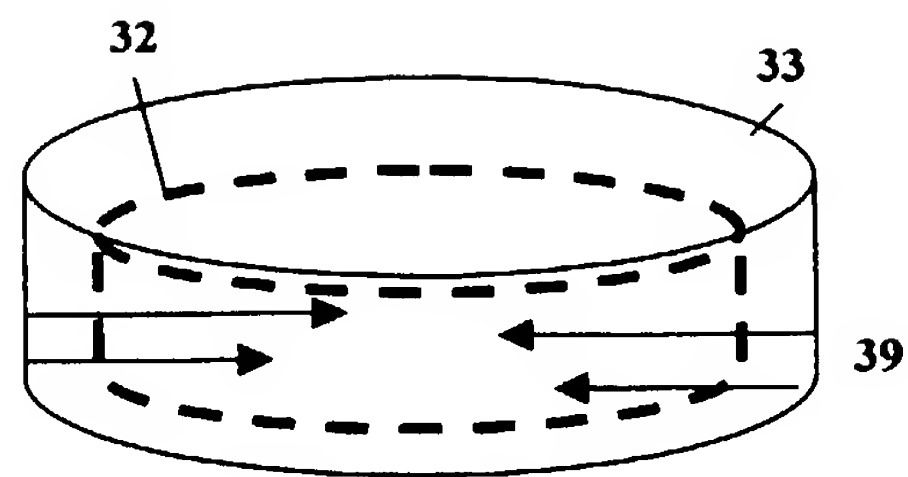


Fig. 10b.

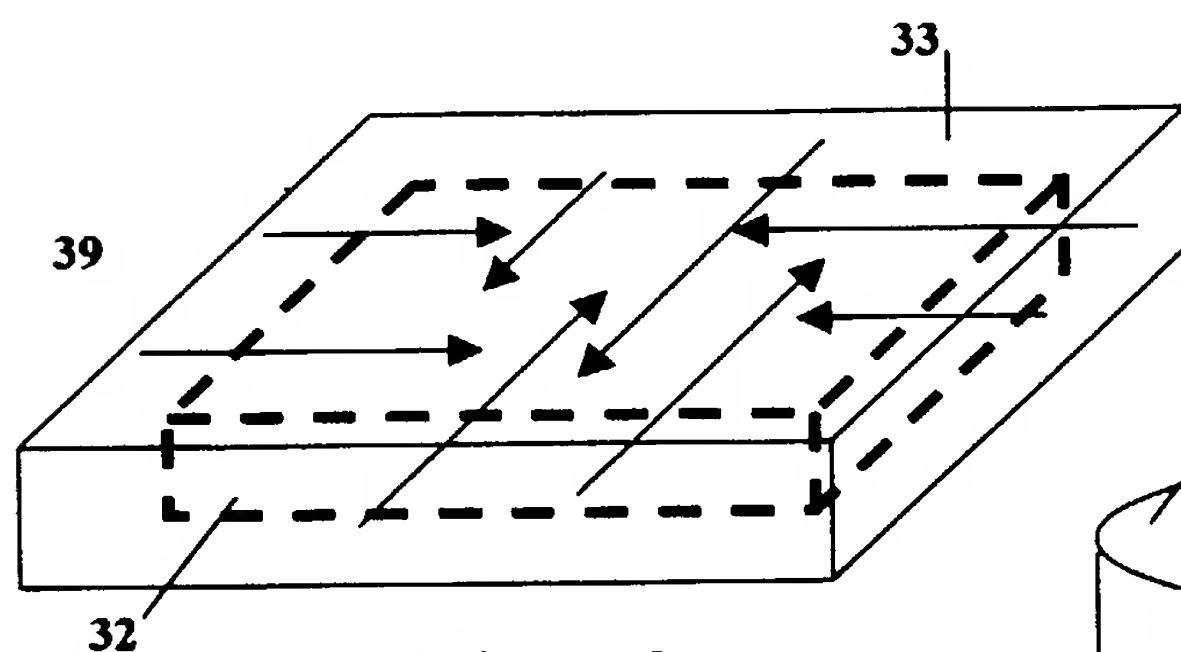


Fig. 10c.

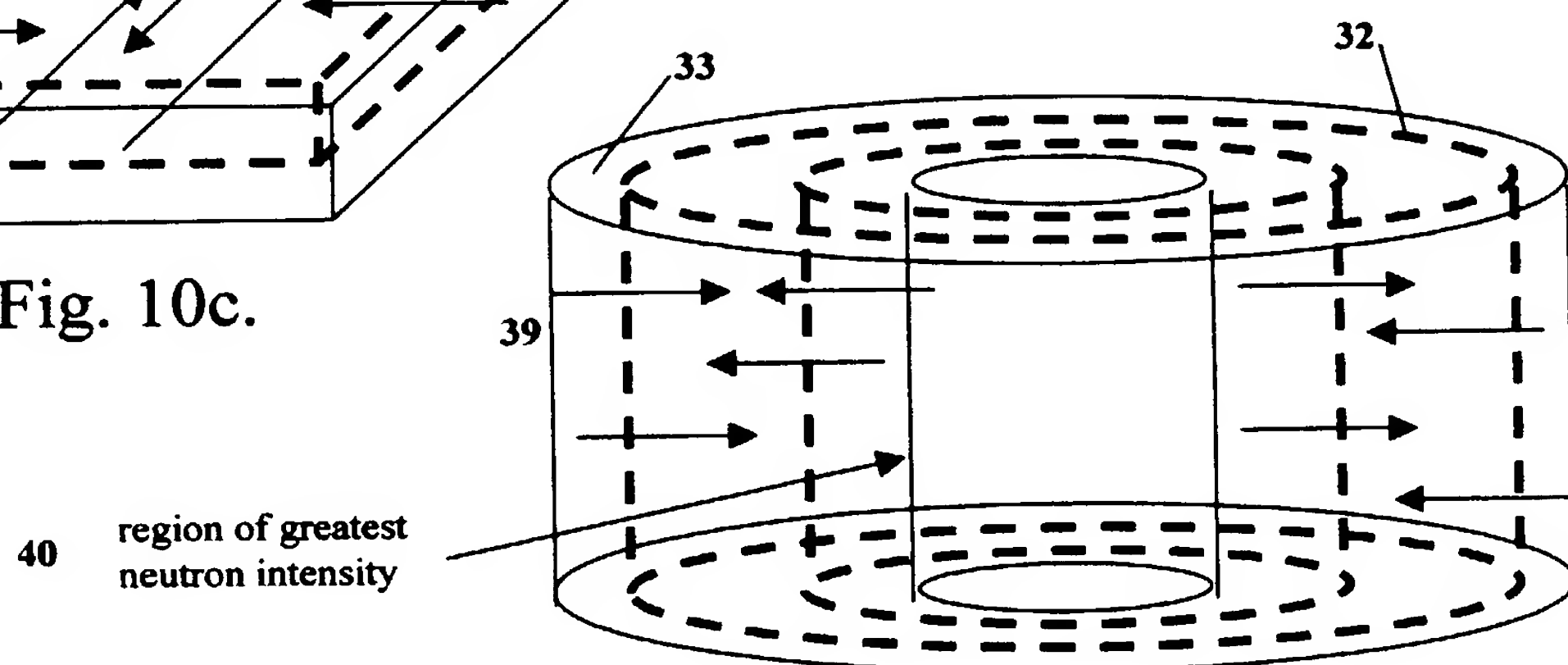


Fig. 10d.

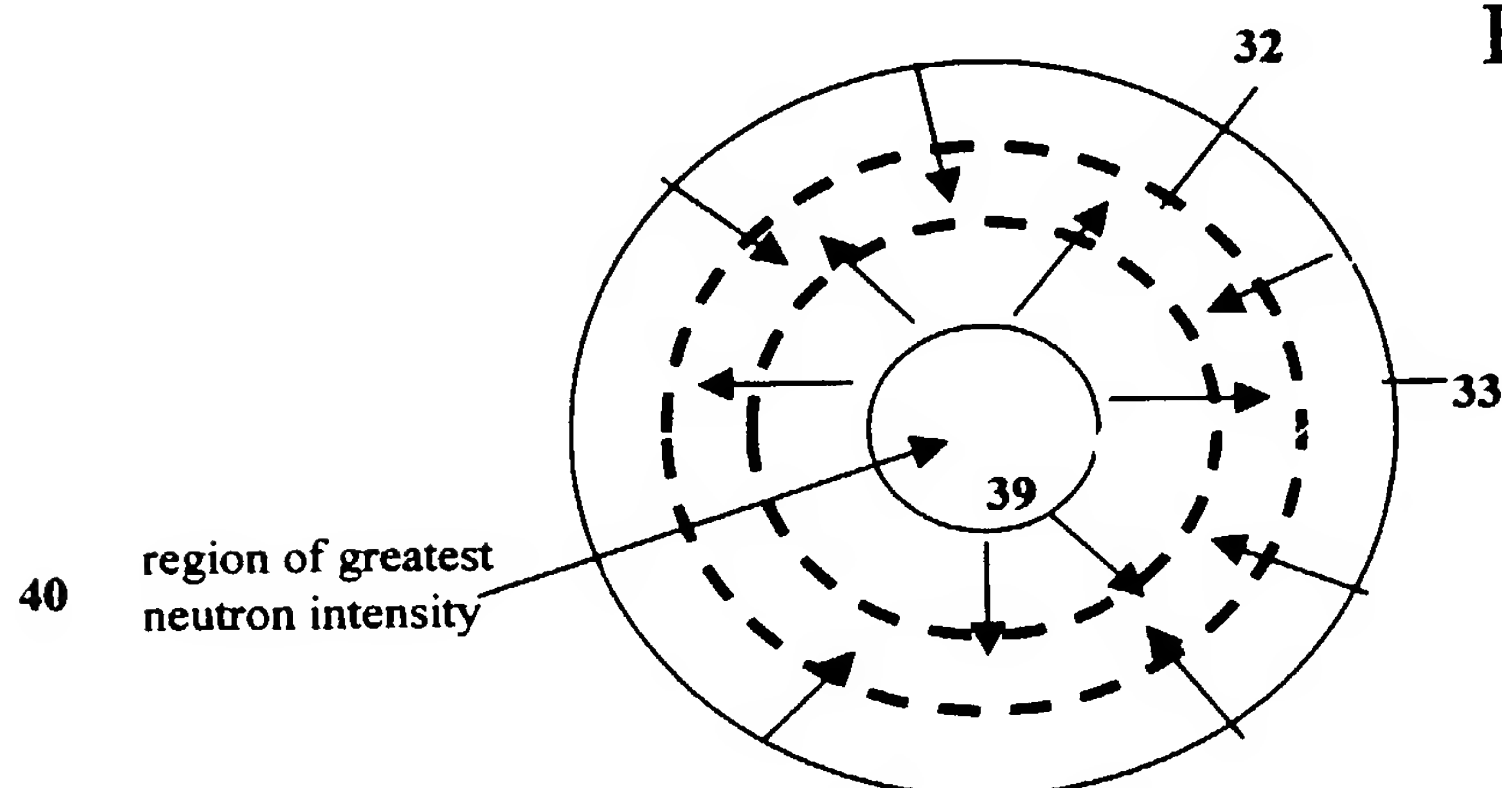


Fig. 10e.

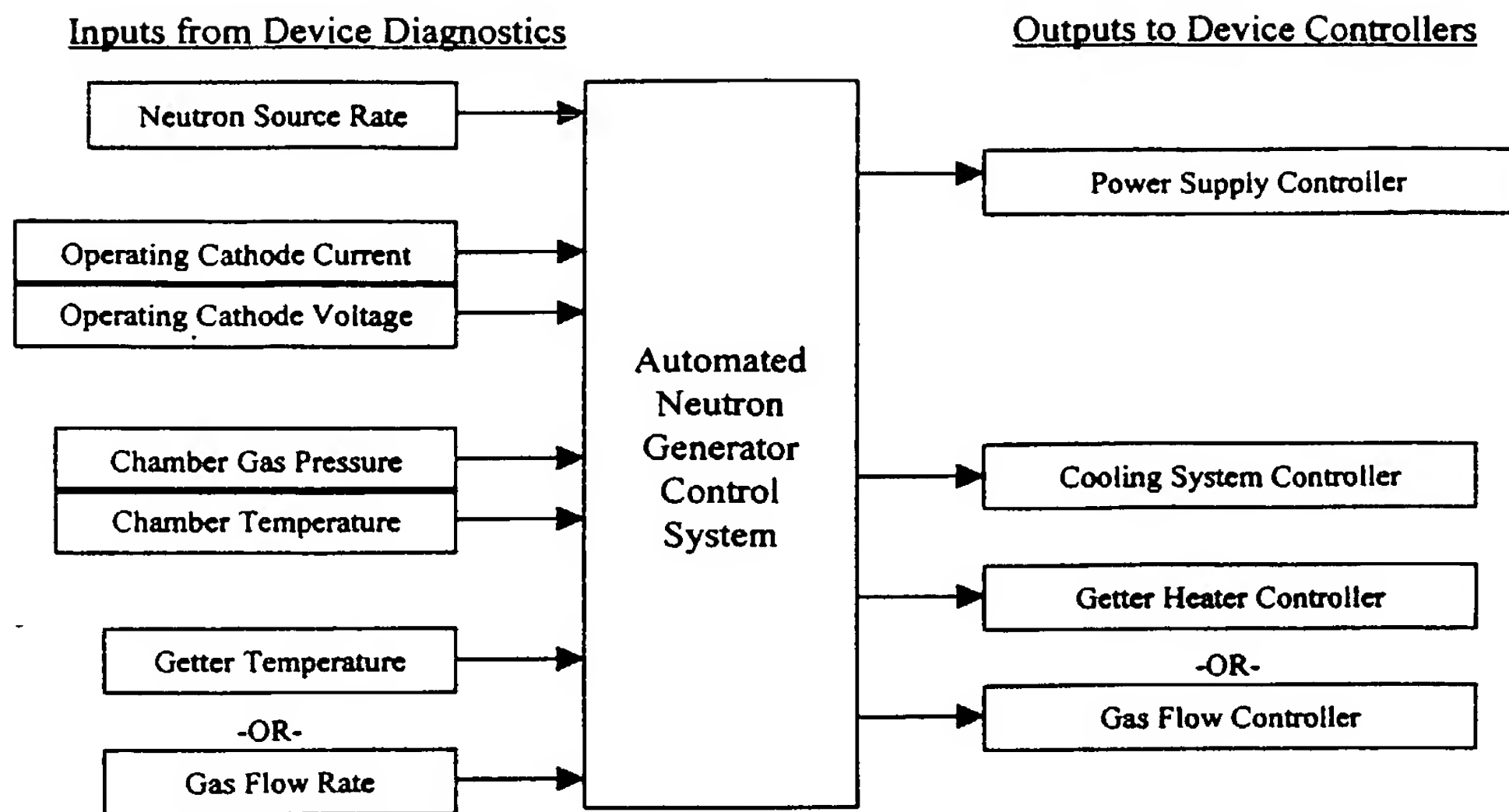


Fig. 11.

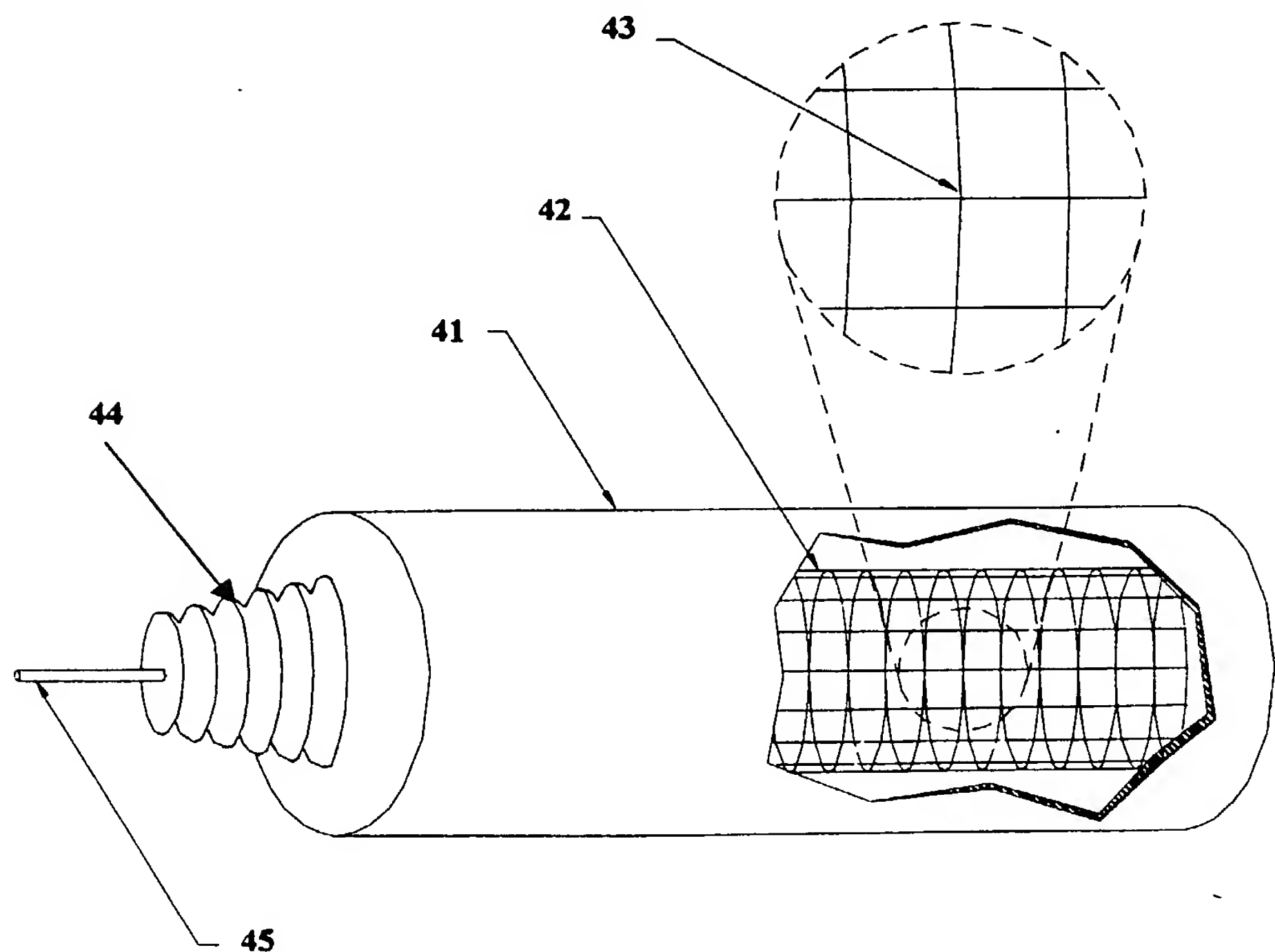


Fig. 12.

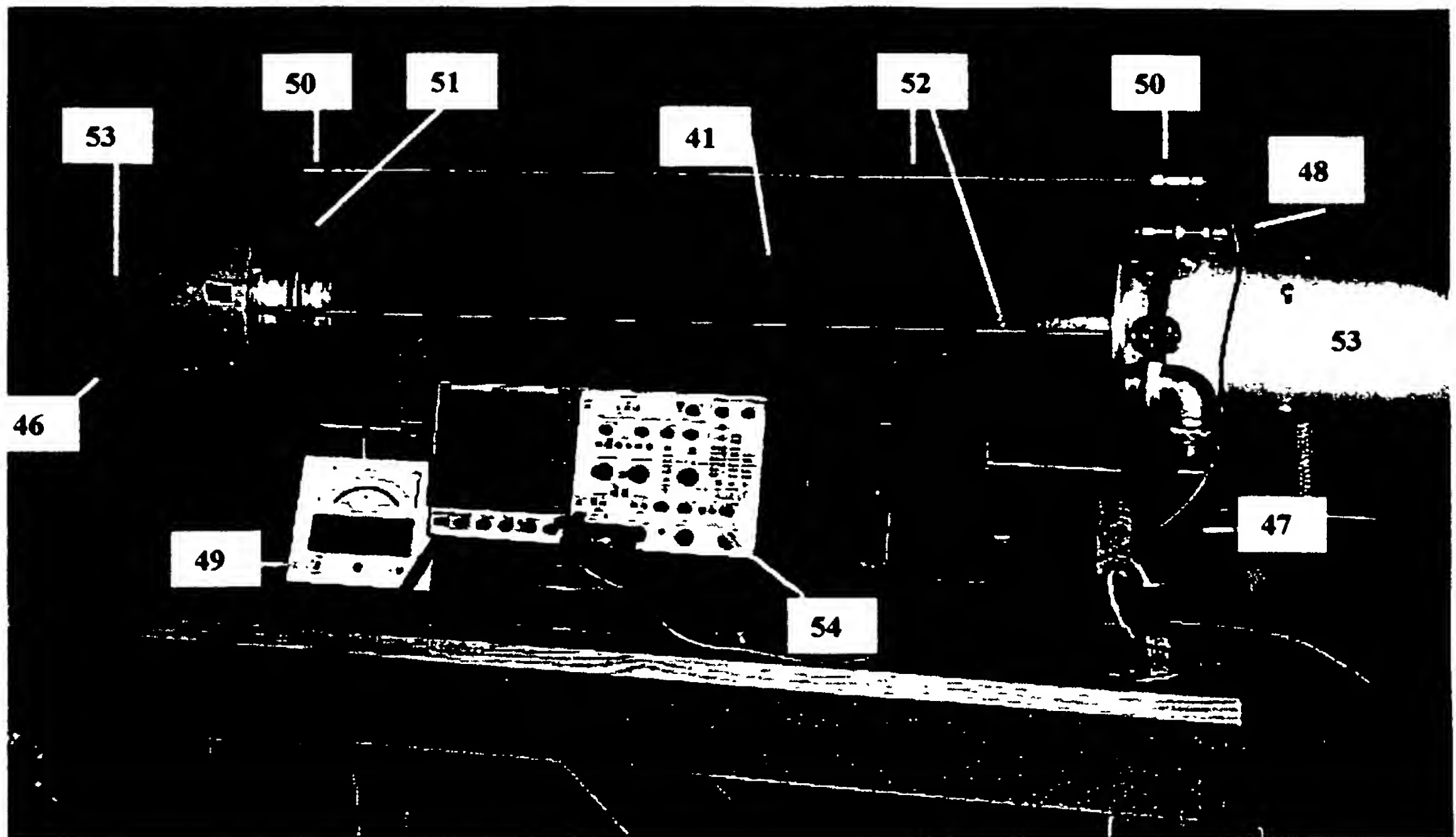


Fig. 13.

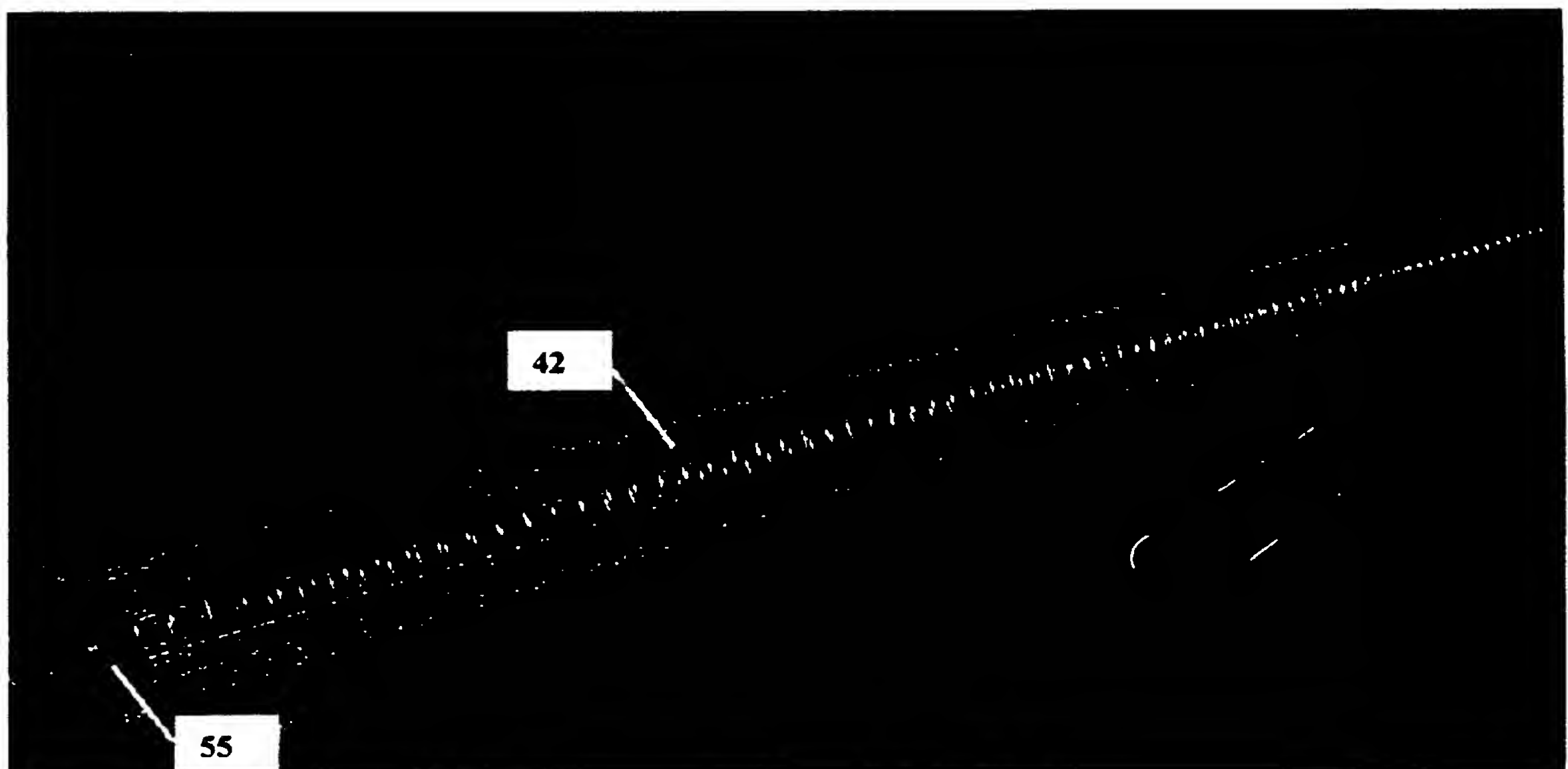


Fig. 14.

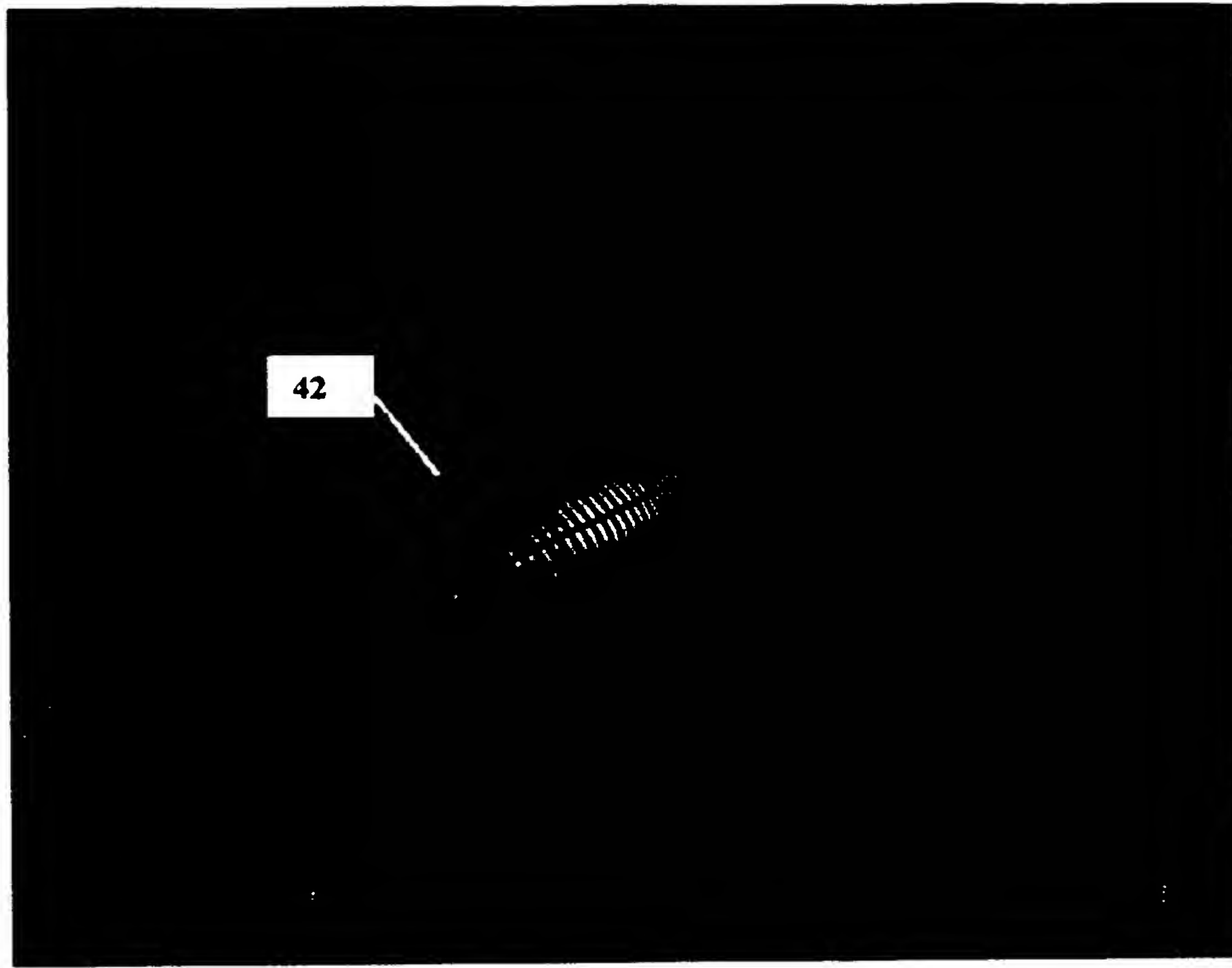


Fig. 15.

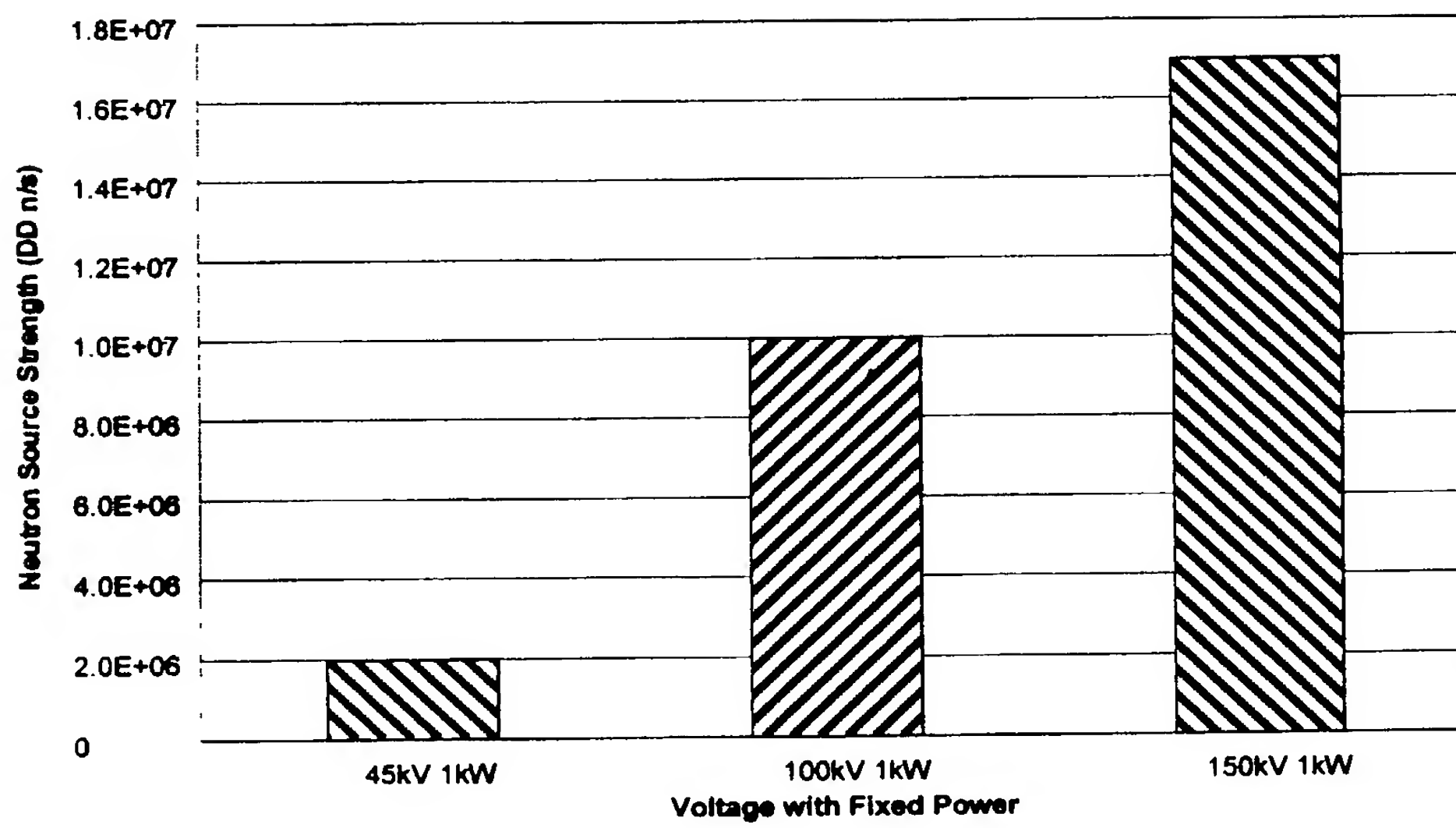


Fig. 16.

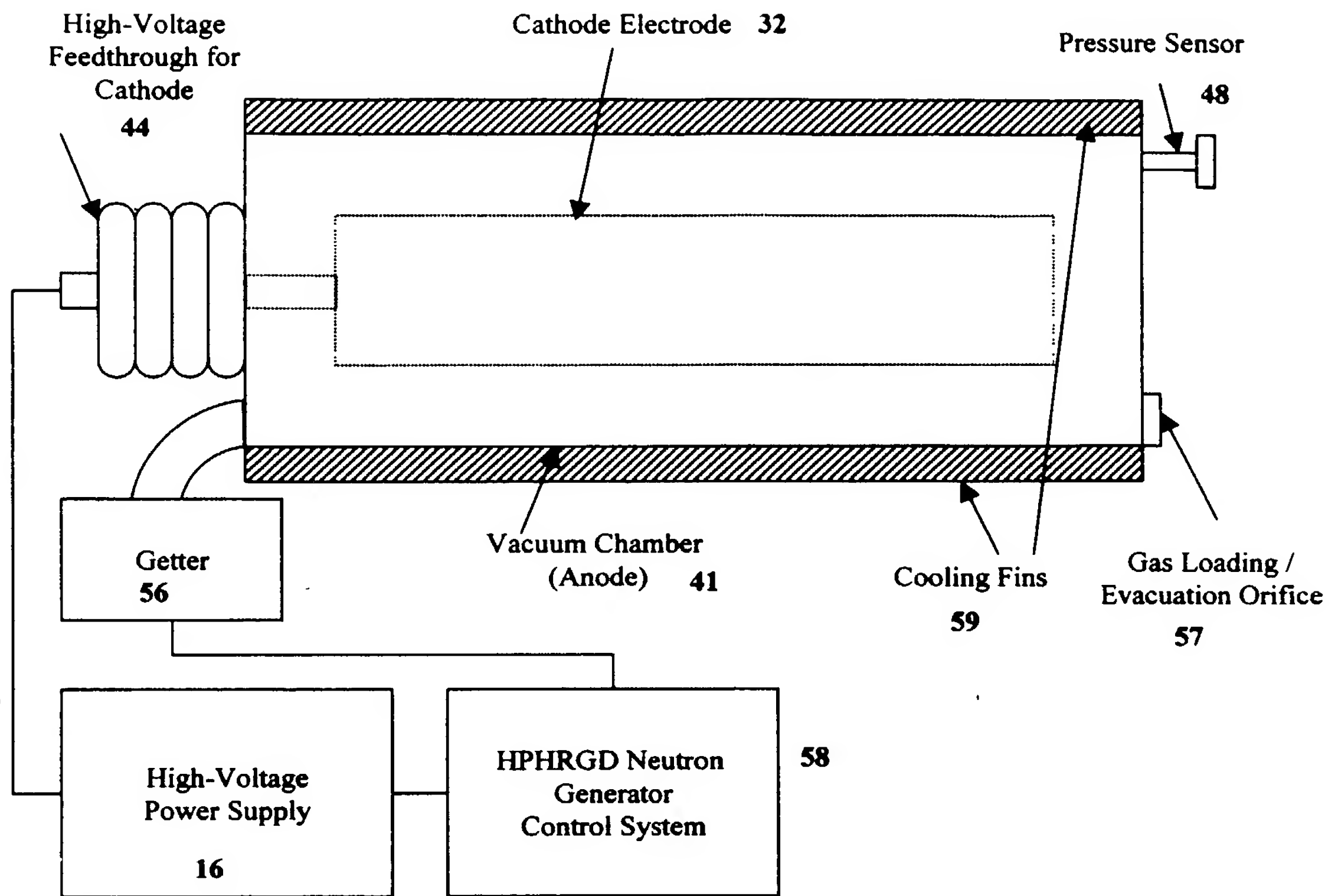


Fig. 17.

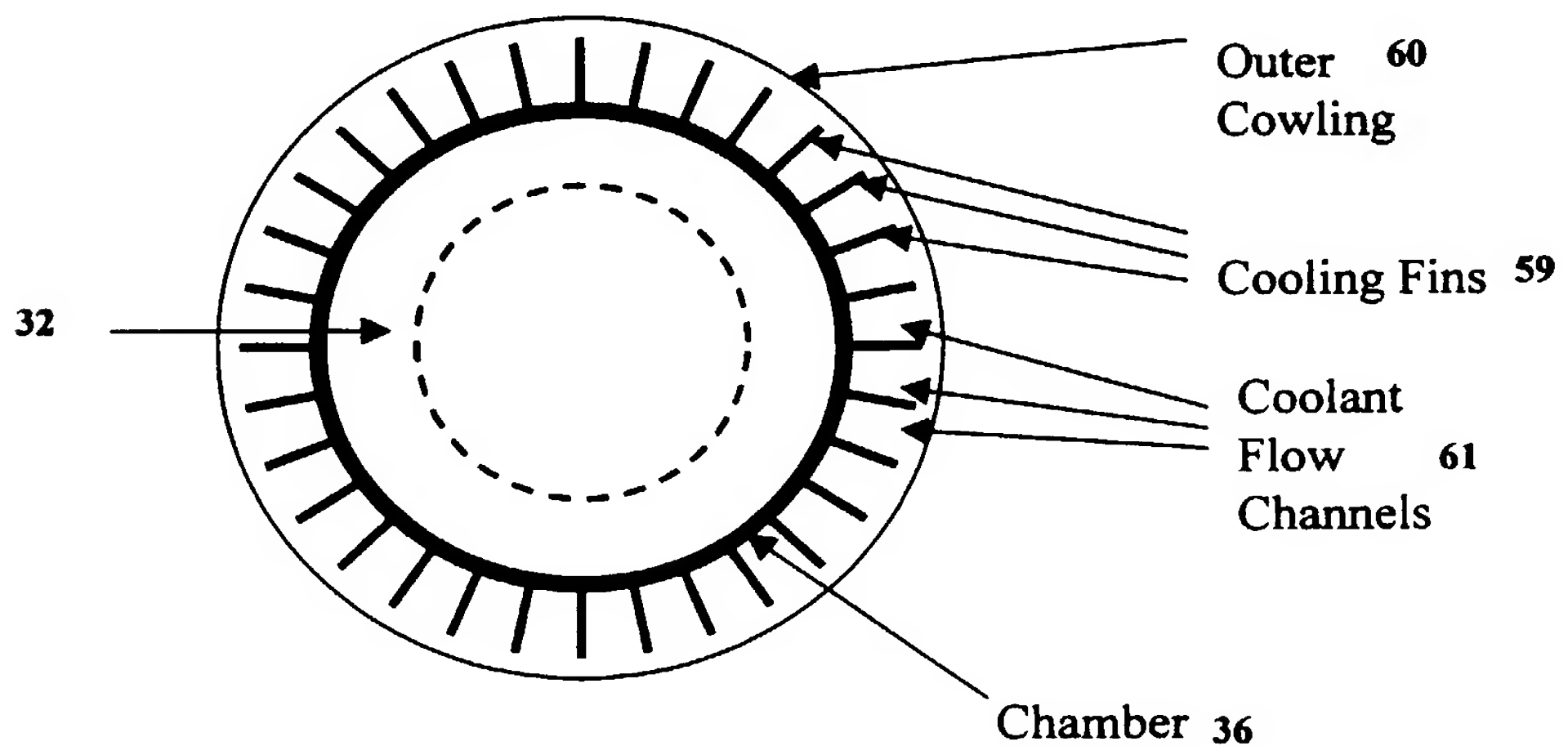


Fig. 18.

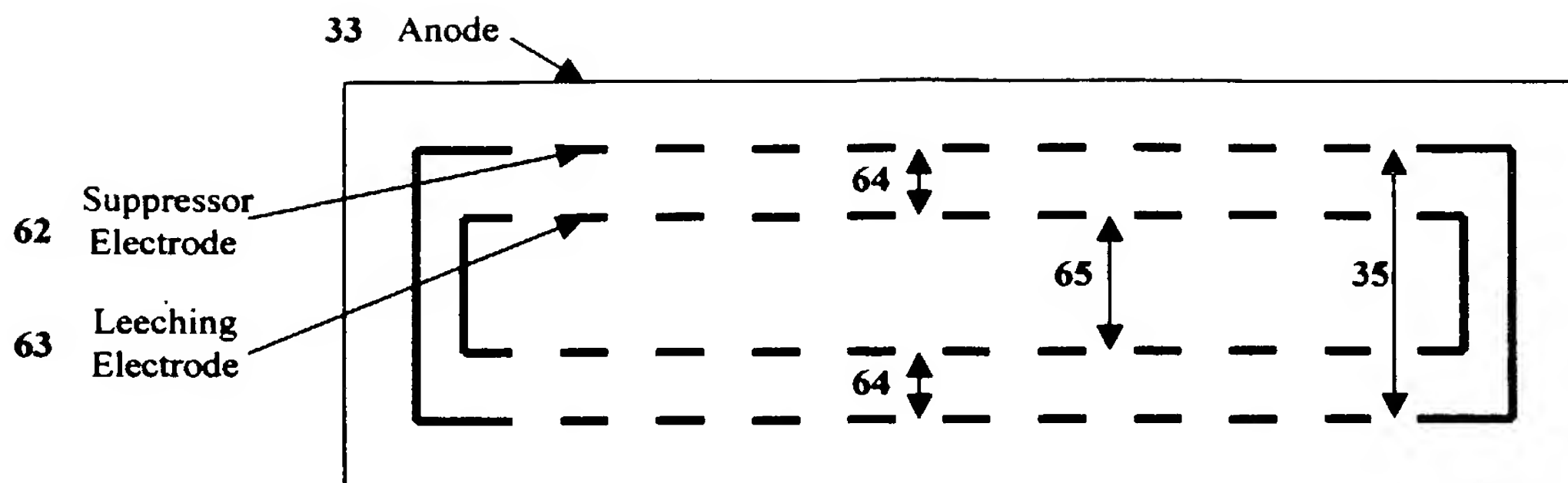


Fig. 19.

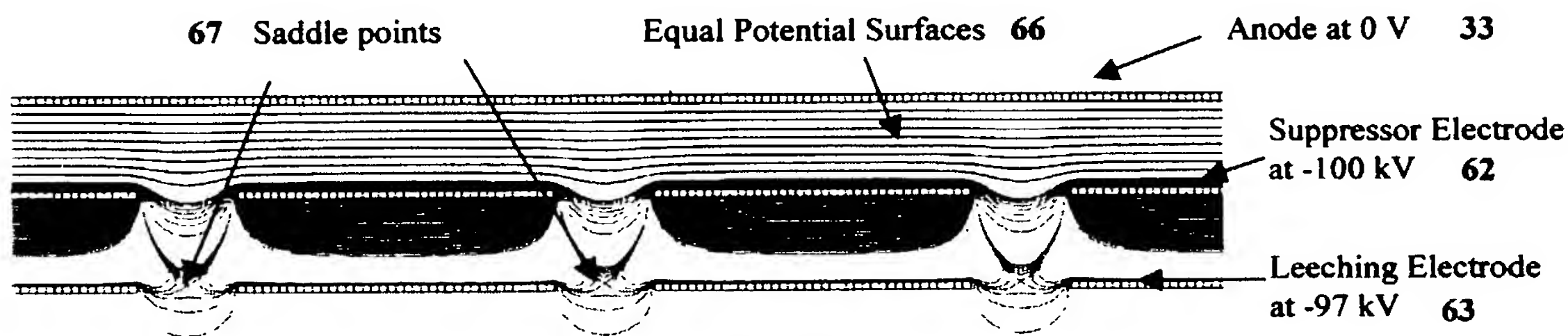


Fig. 20.

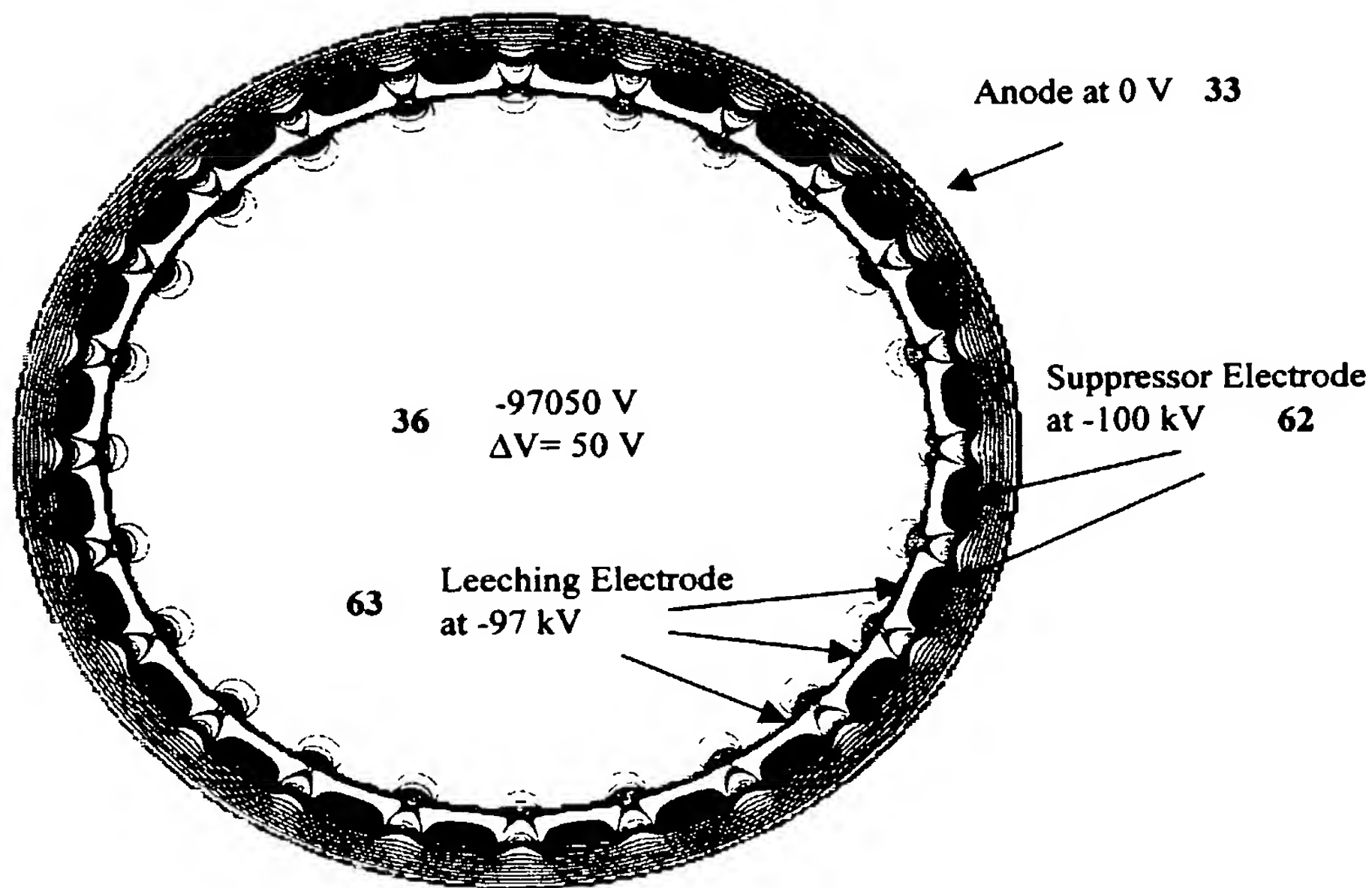


Fig. 21.

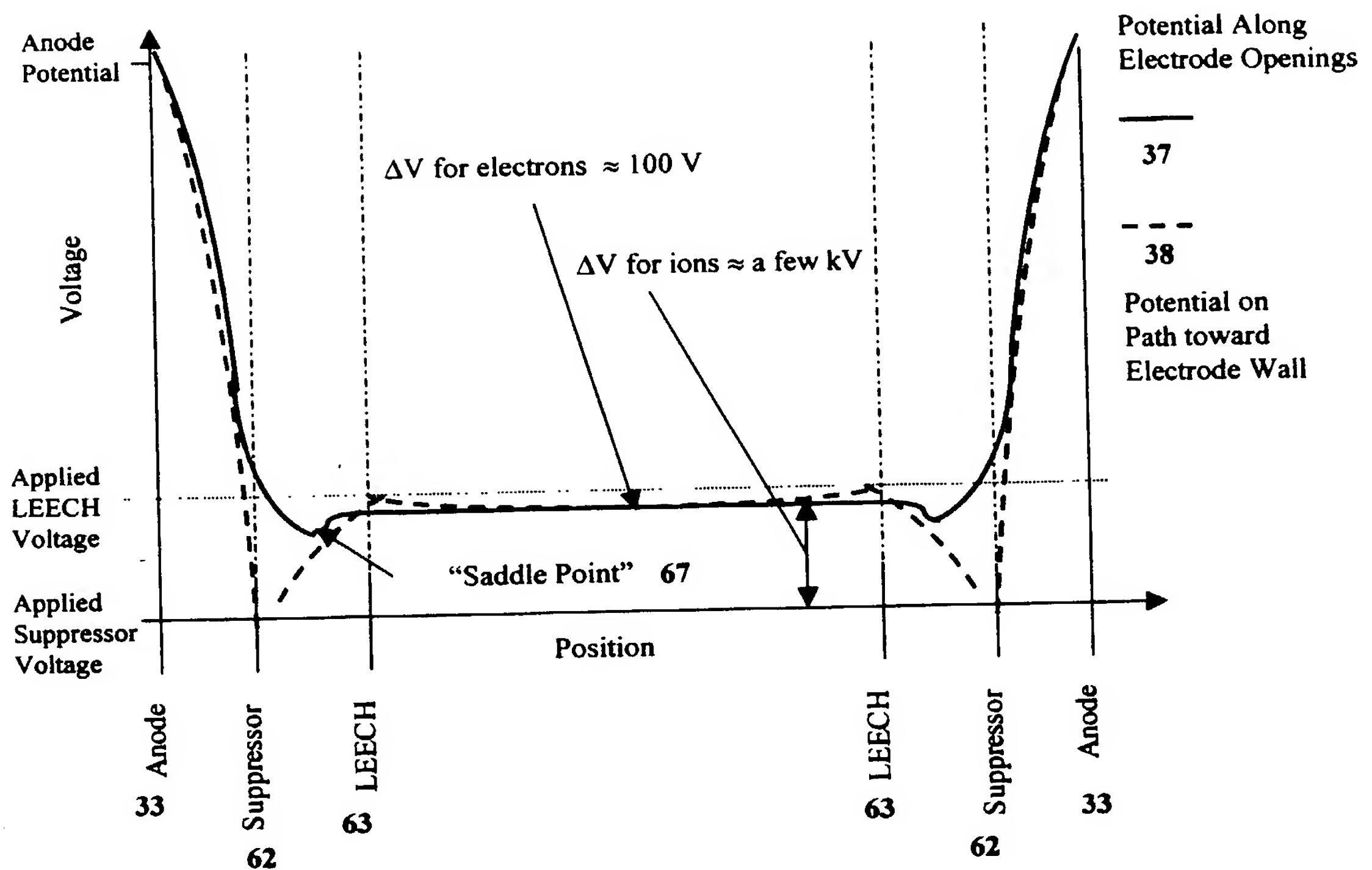


Fig. 22.

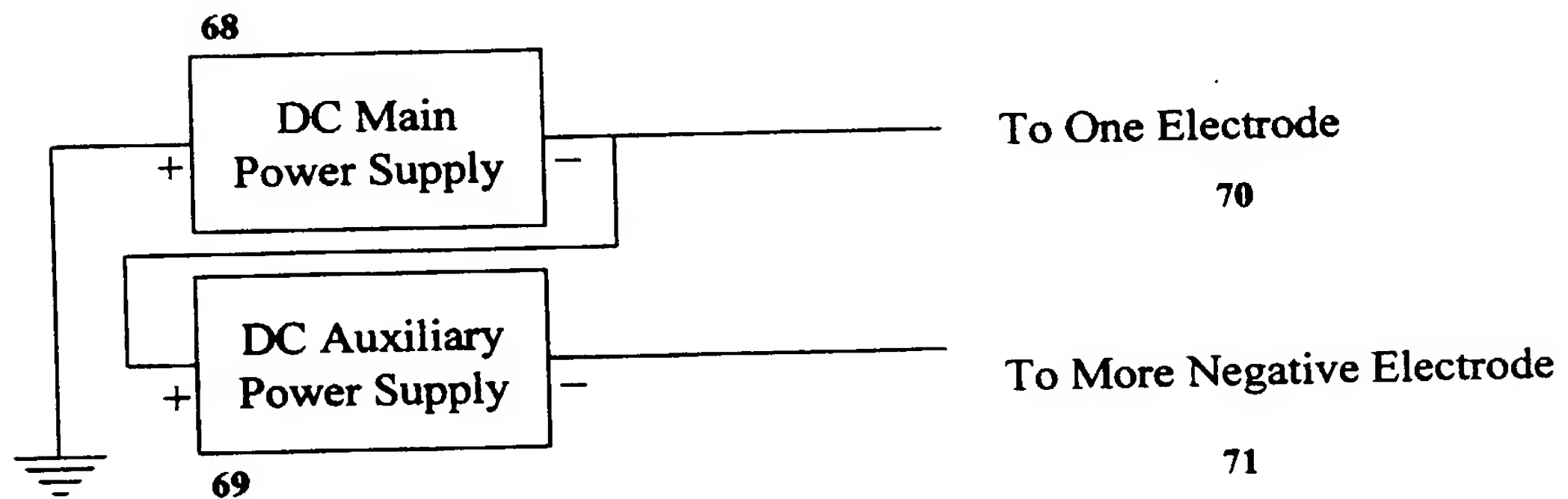


Fig. 23.

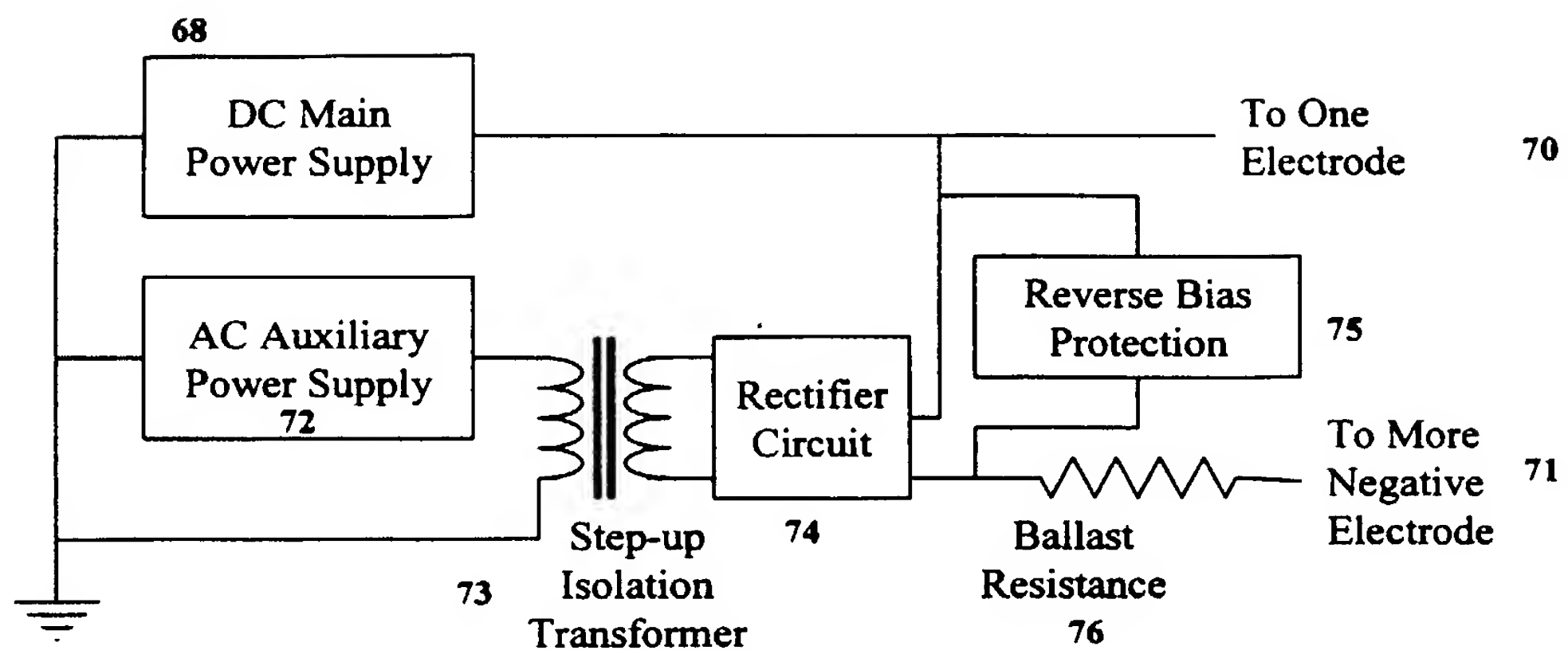


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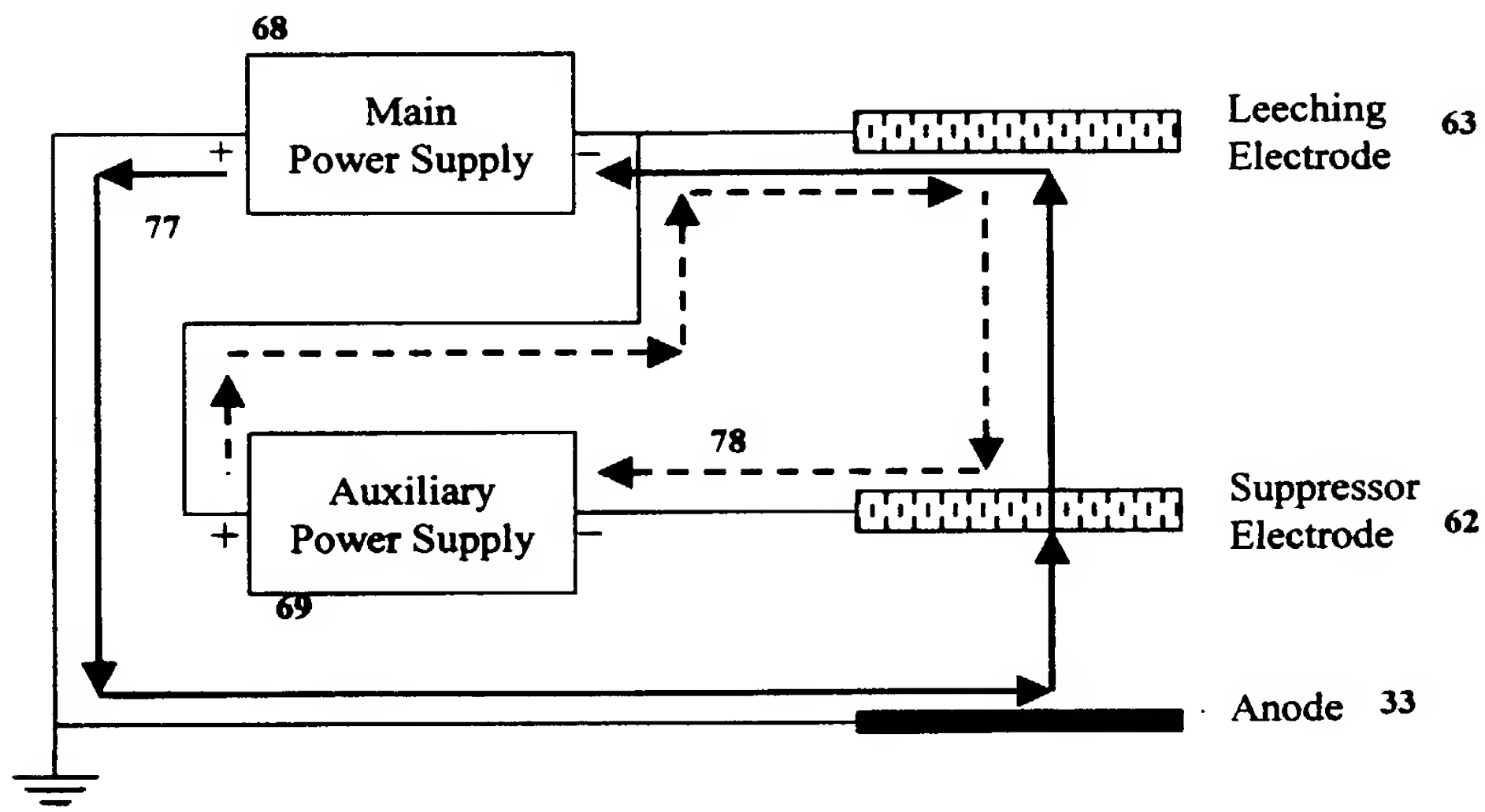


Fig. 25.

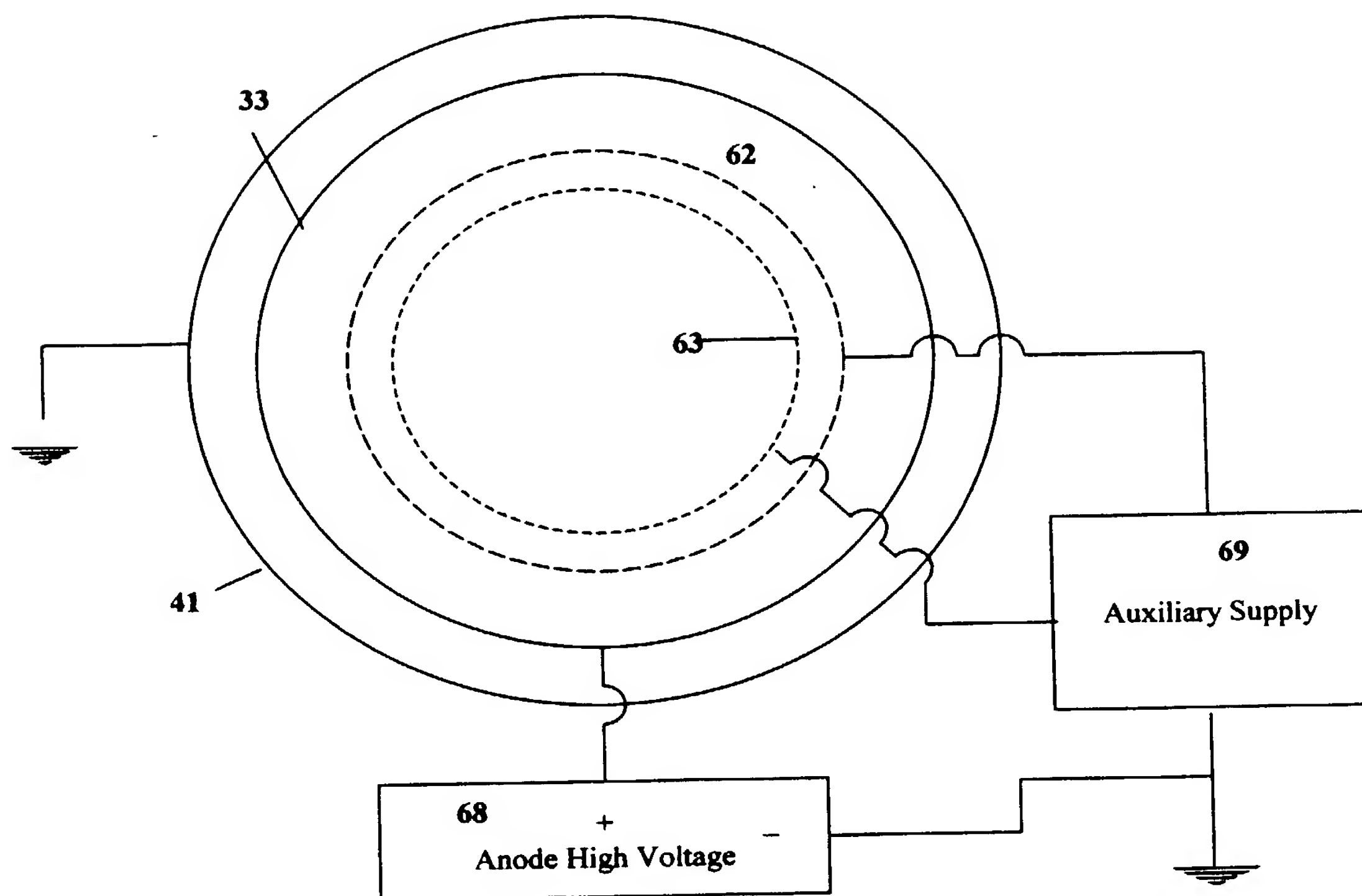


Fig. 26.

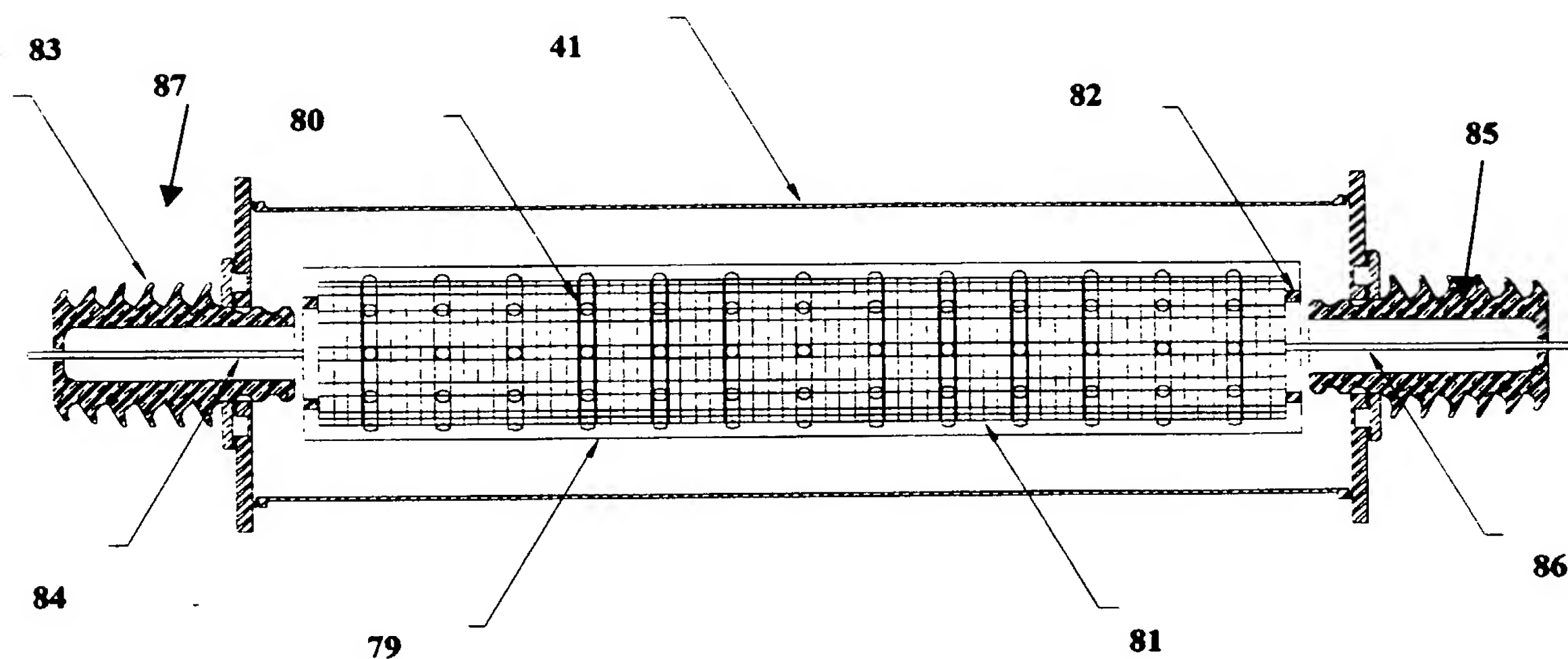


Fig. 27a.

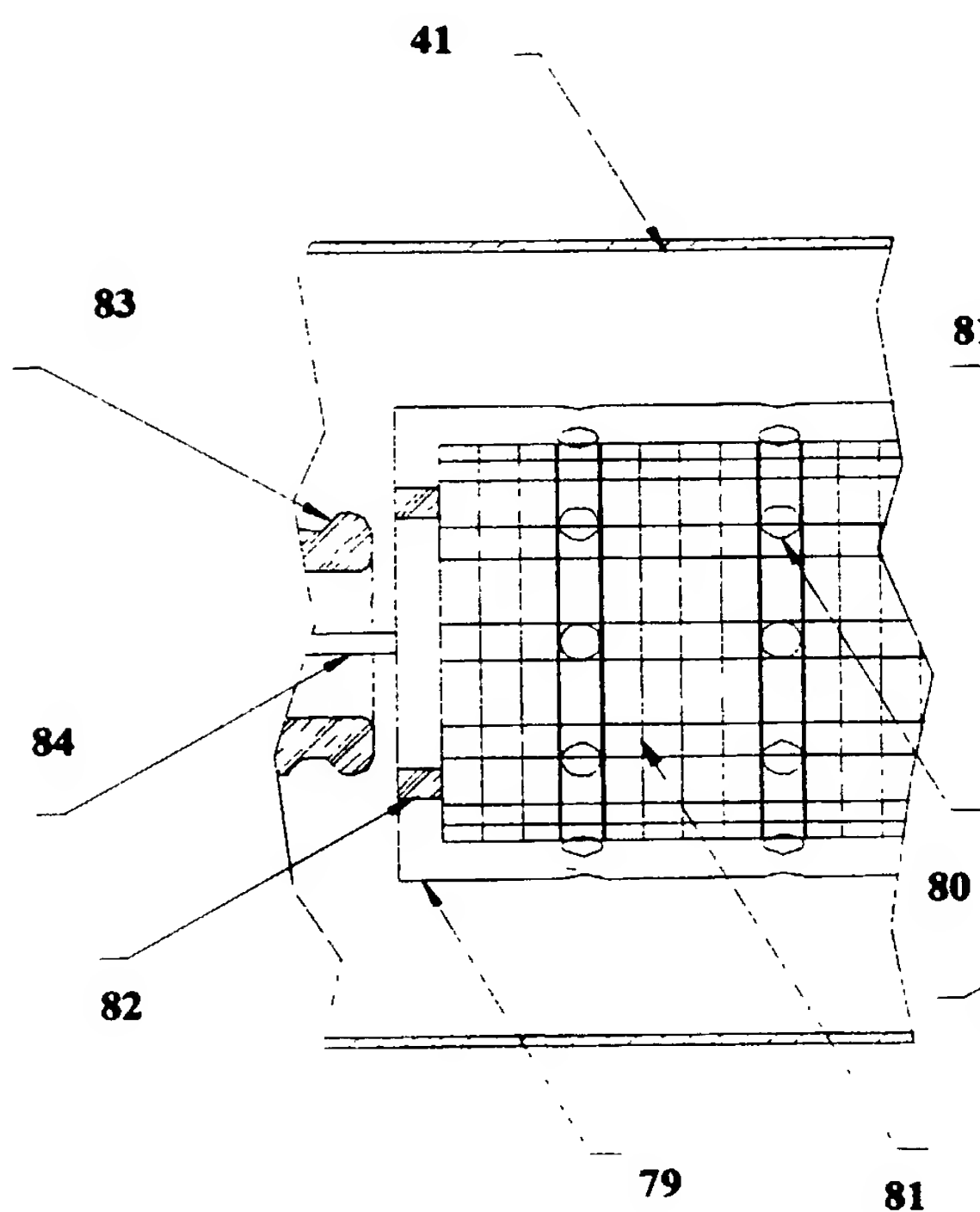


Fig. 27b.

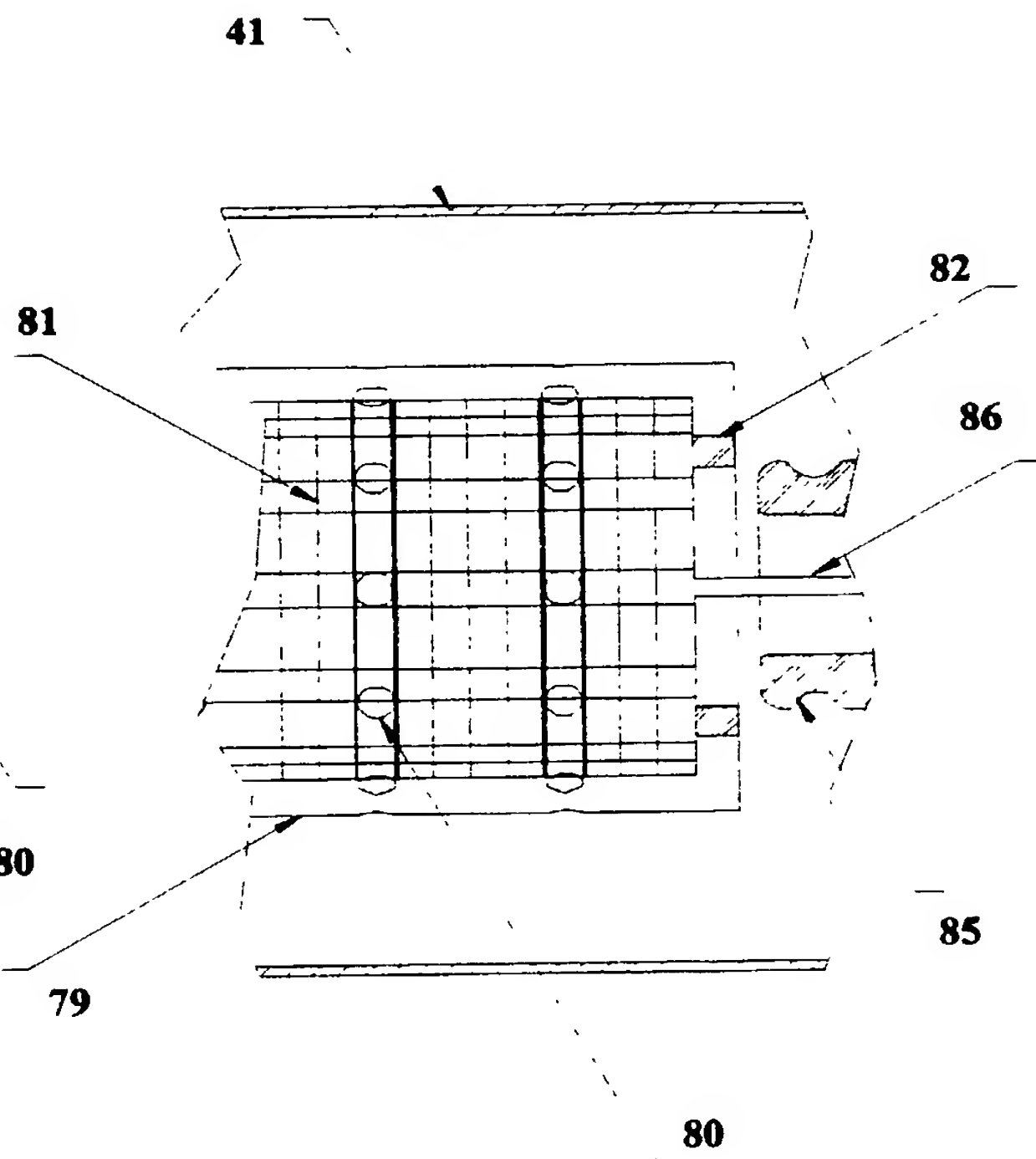


Fig. 27c.

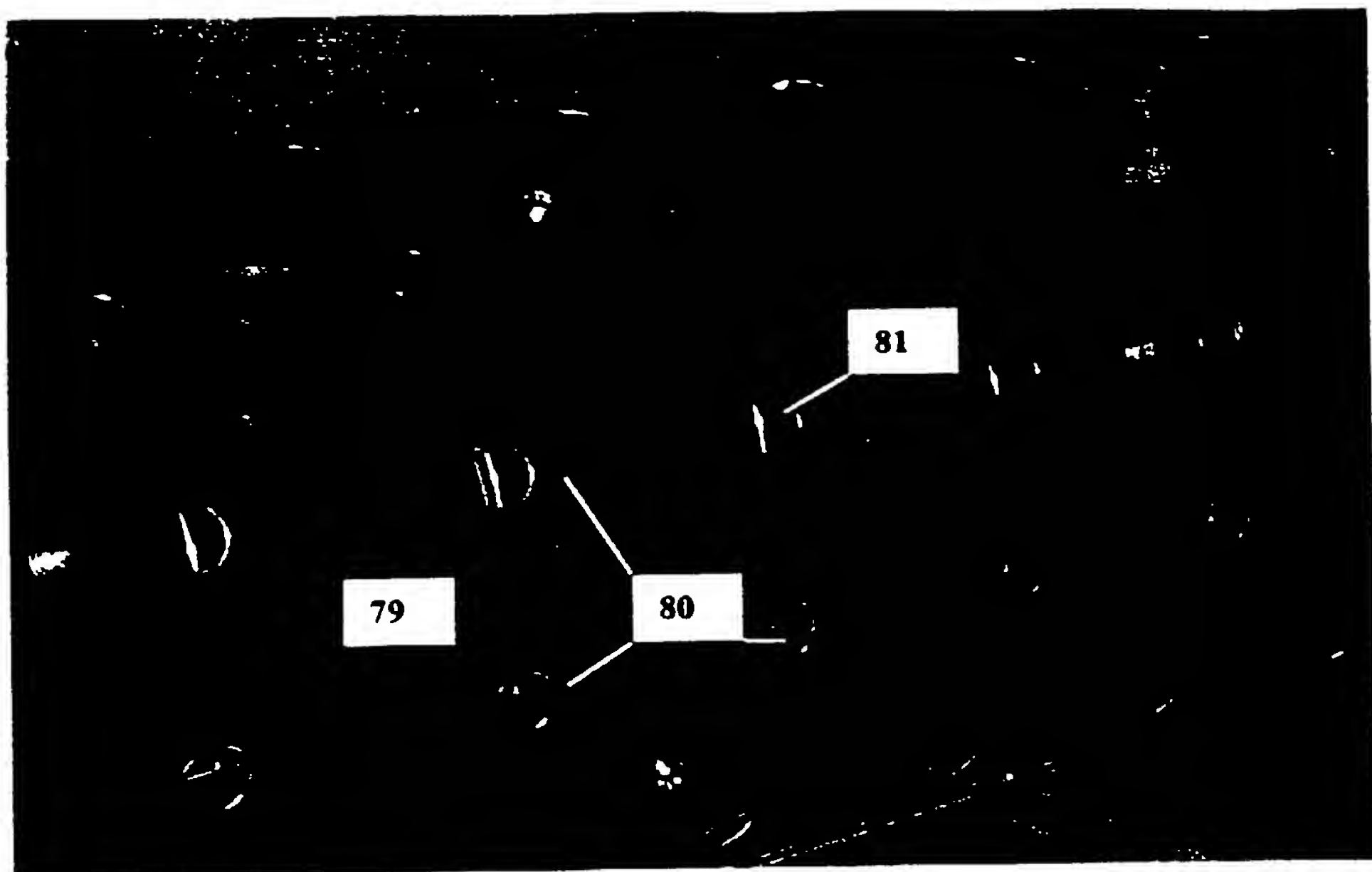


Fig. 28.



Fig. 29.

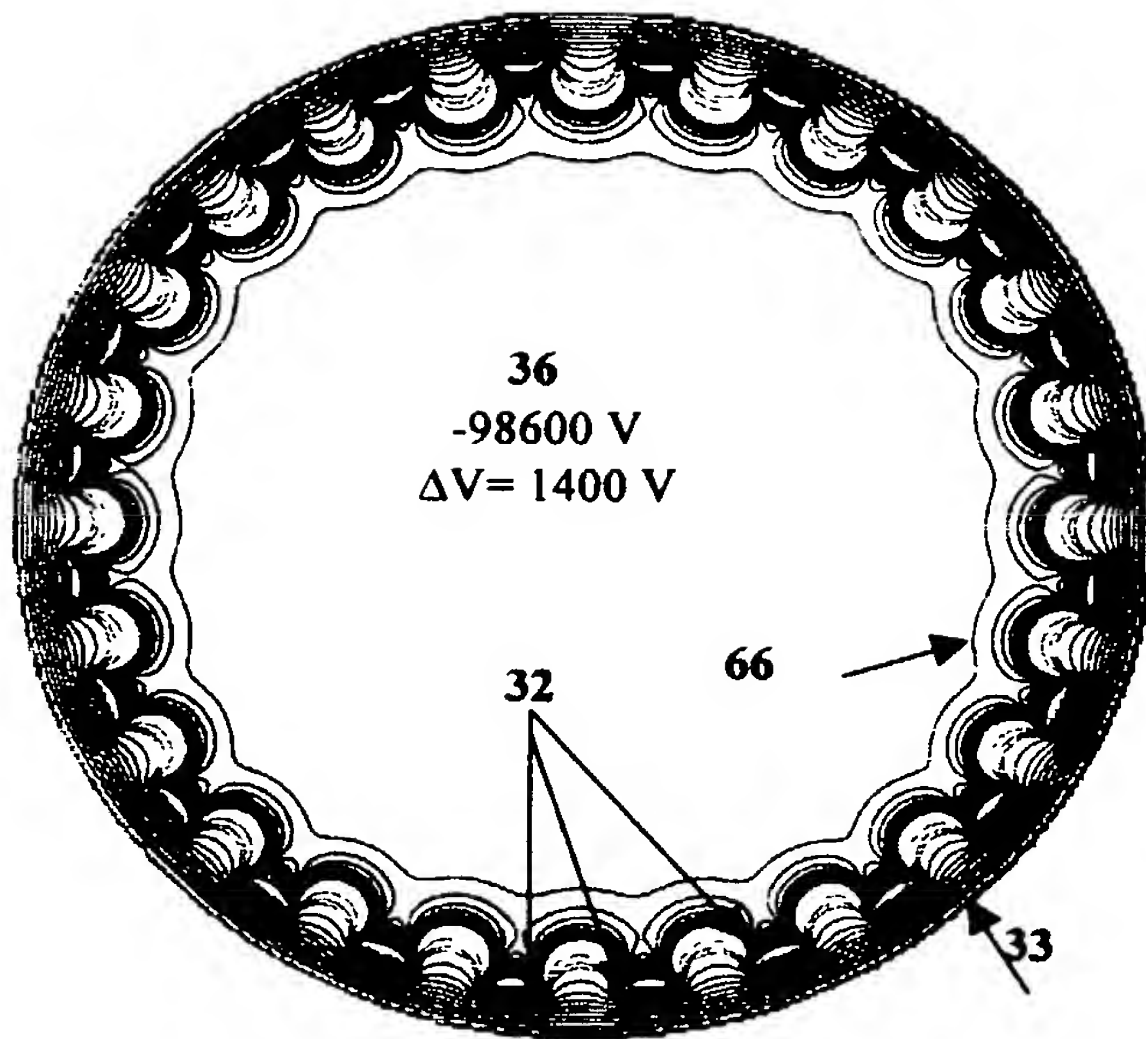


Figure 30a.

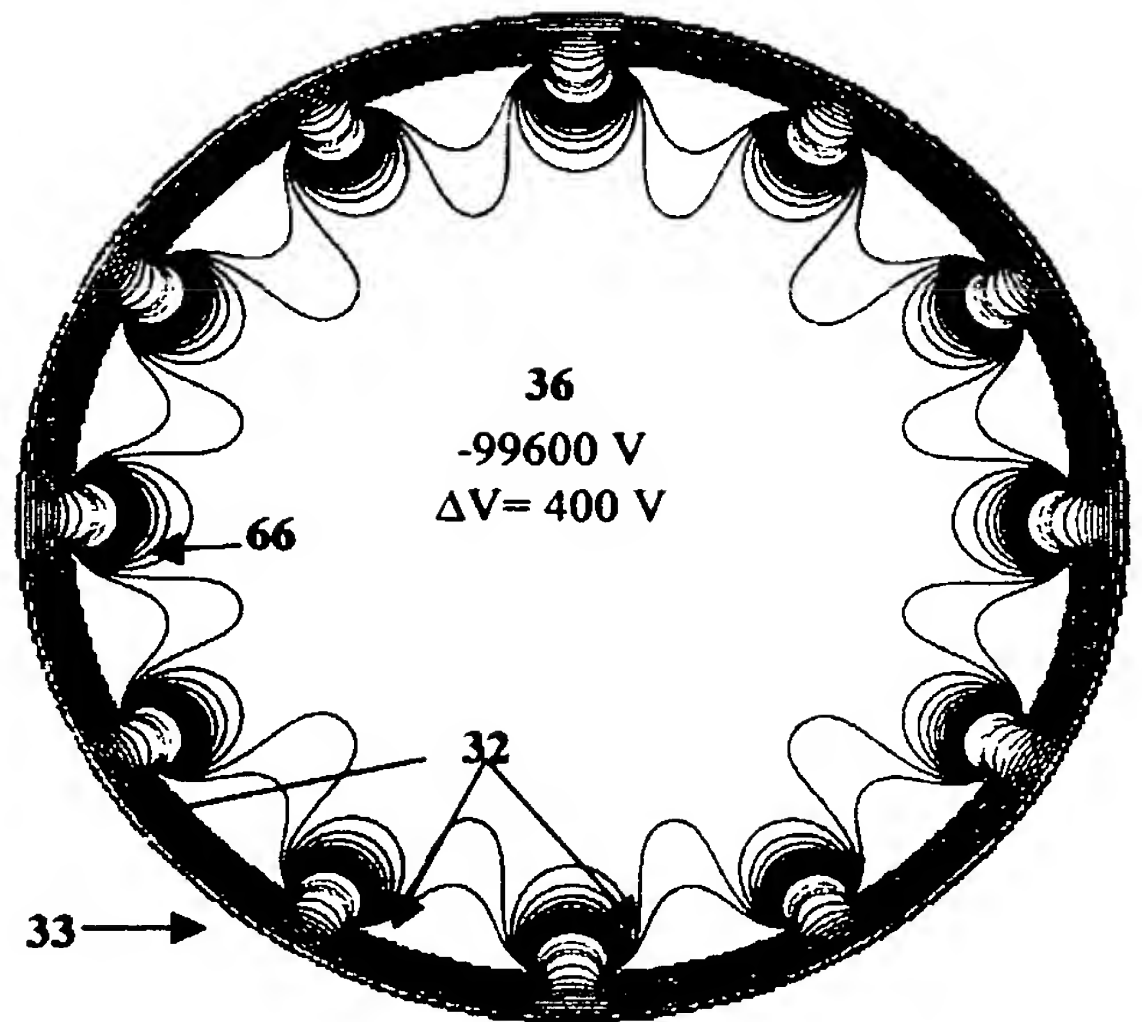


Figure 30b.

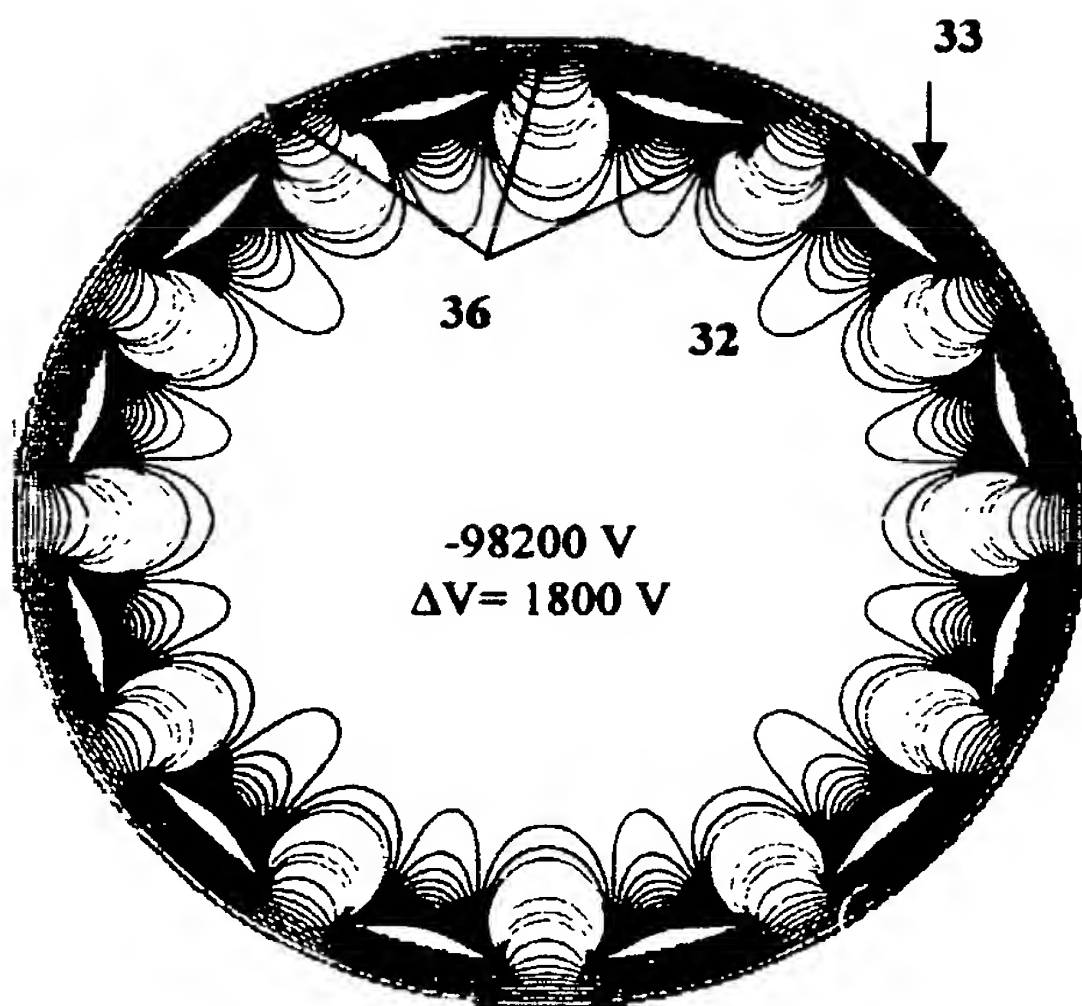


Figure 30c.

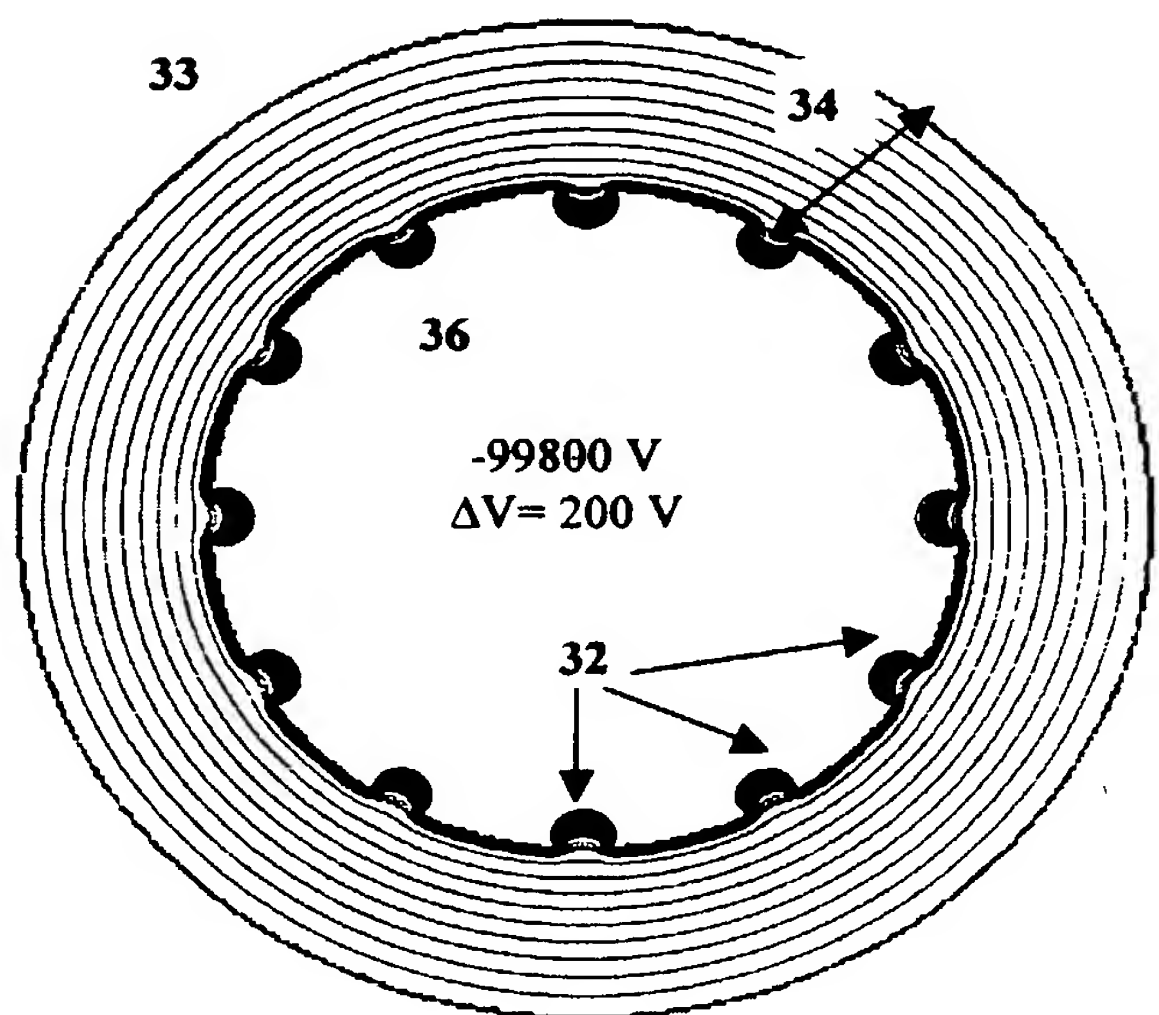


Figure 30d.

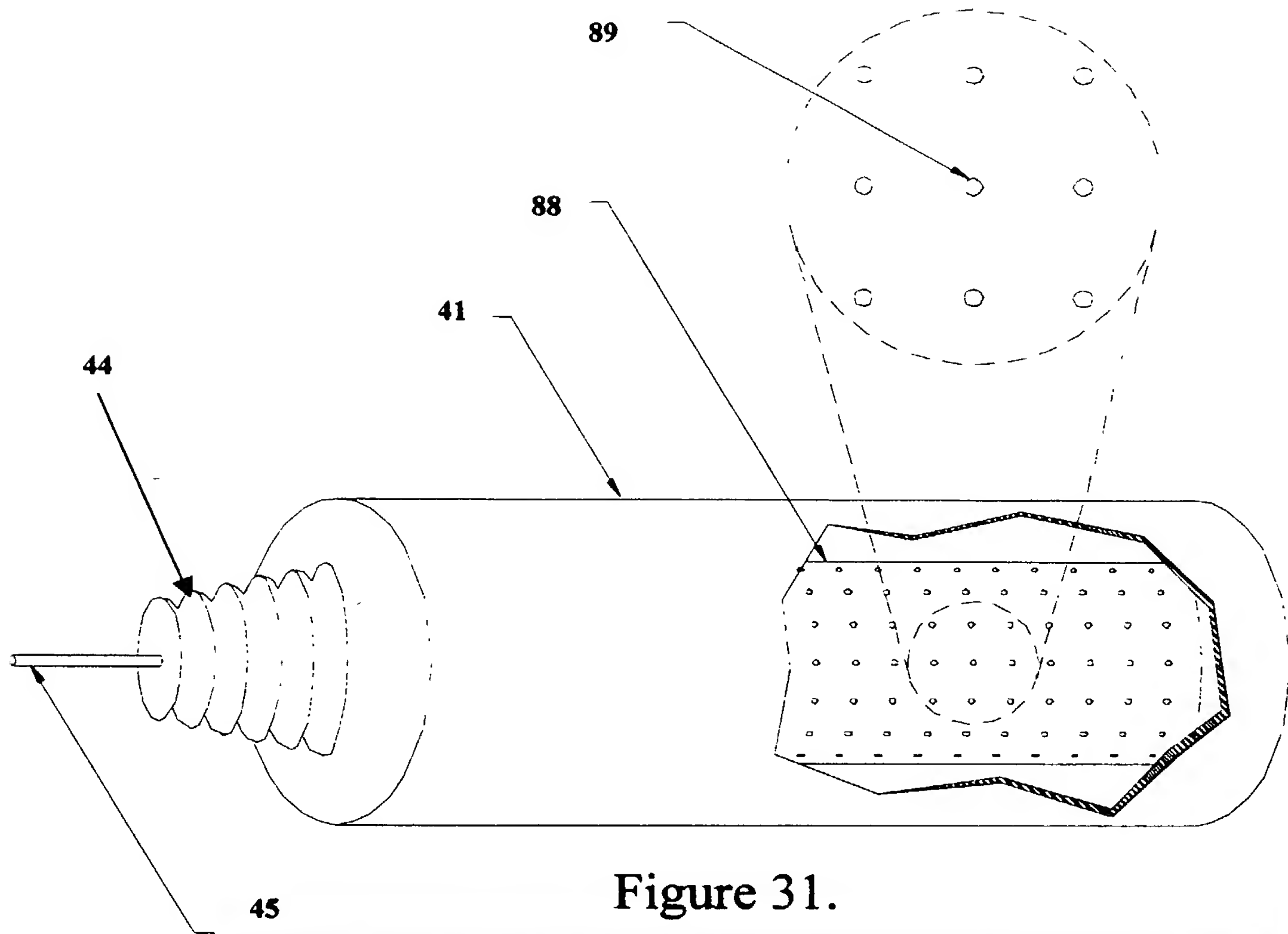


Figure 31.



Figure 32.

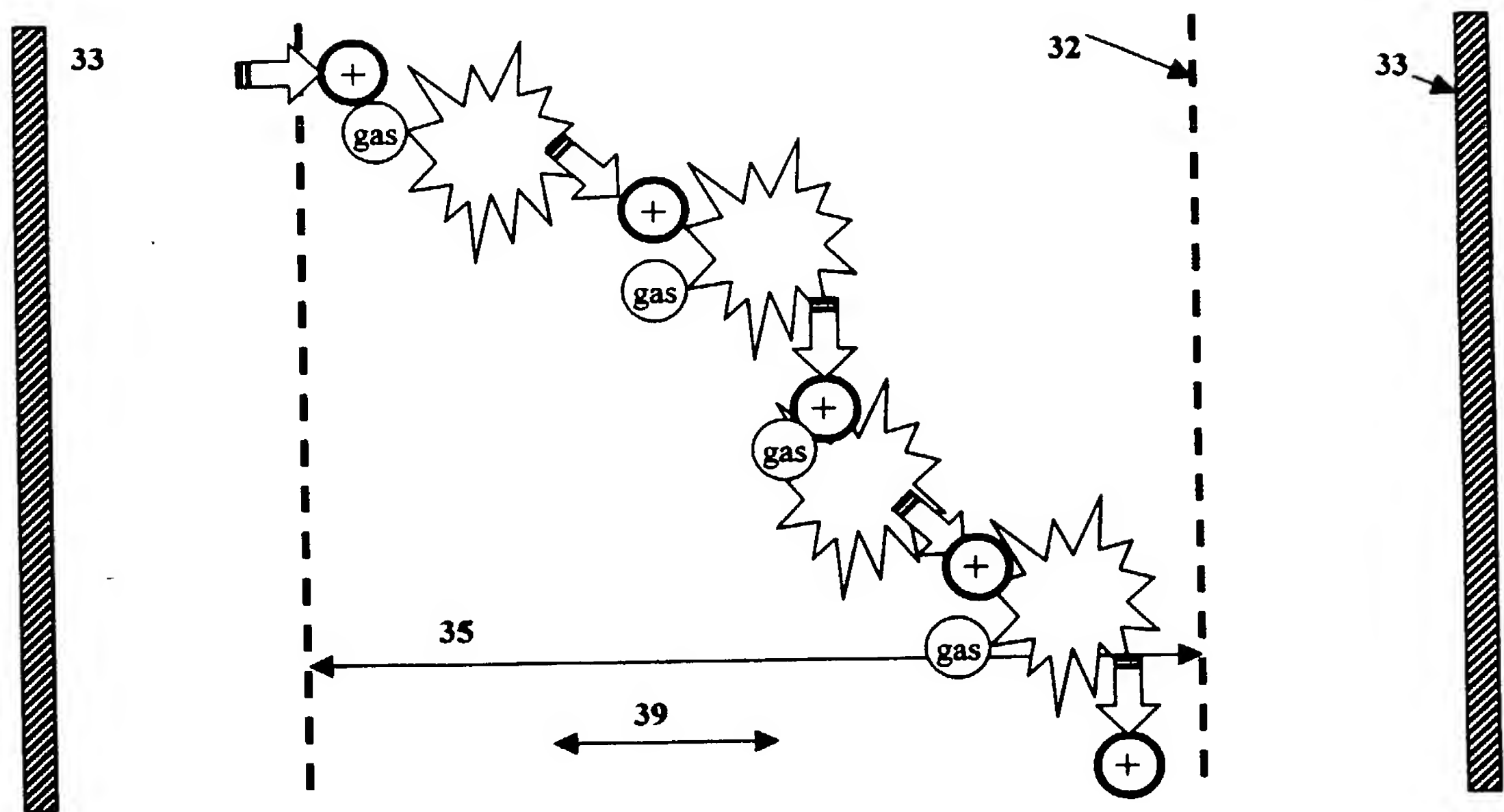


Figure 33a.

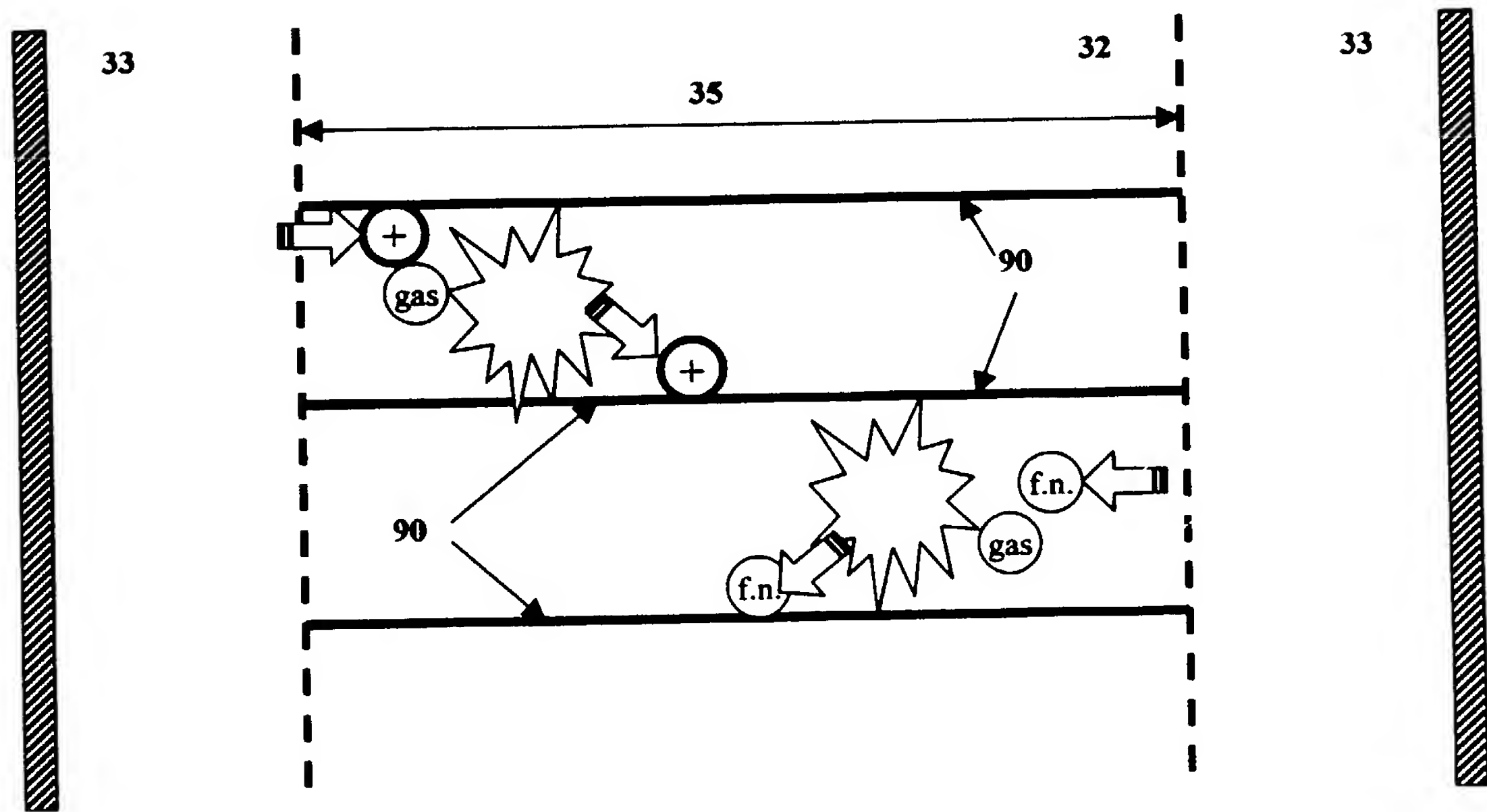


Figure 33b.

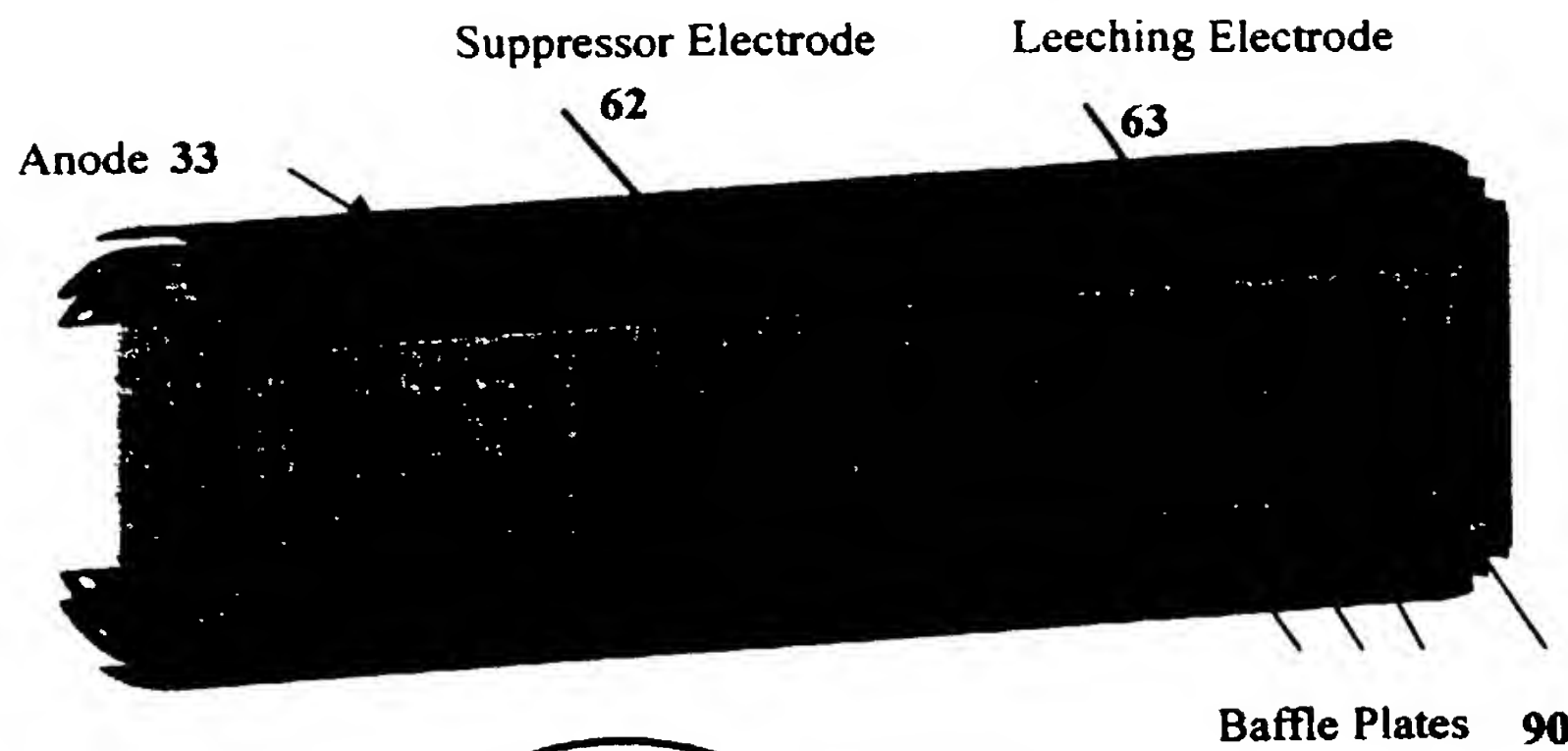


Fig. 34(a).

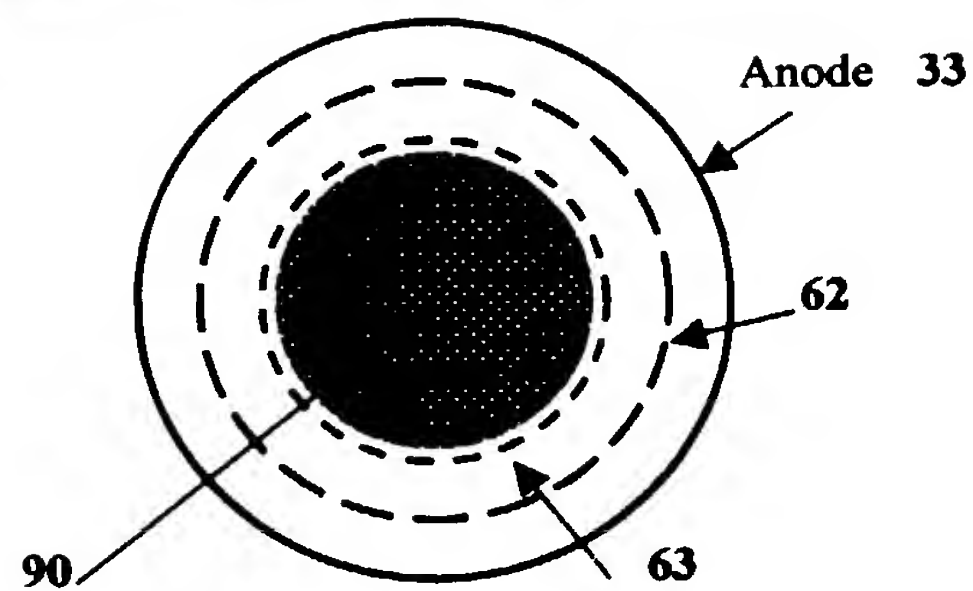


Fig. 34(b).

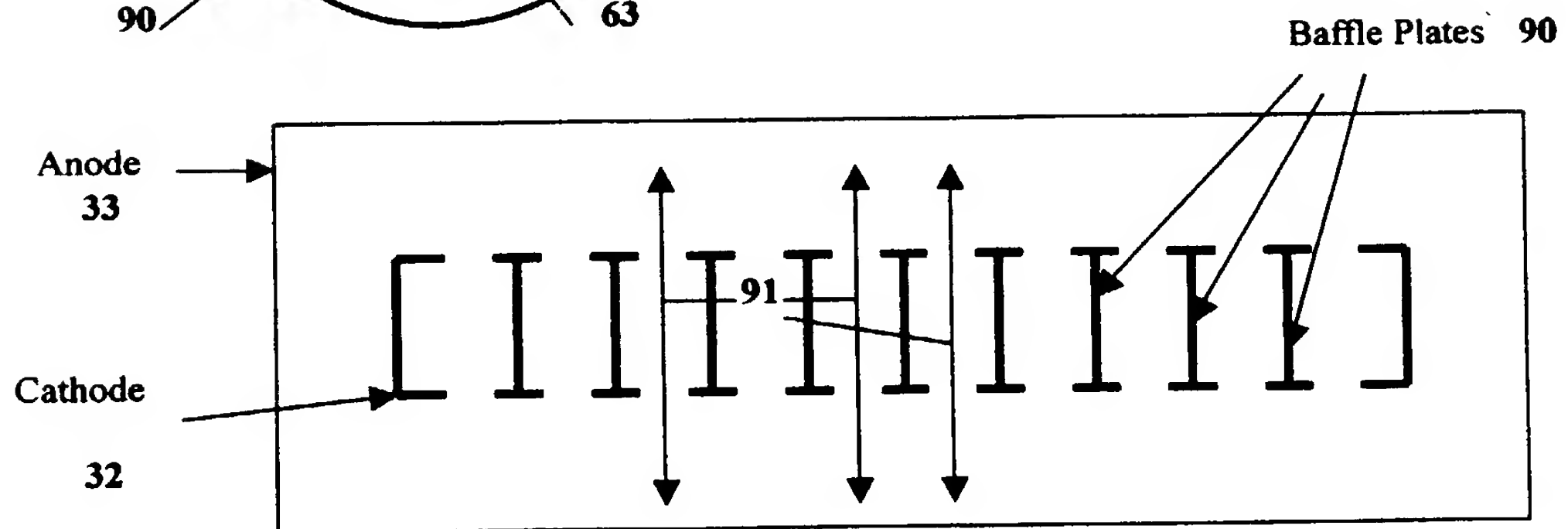


Fig. 35(a).

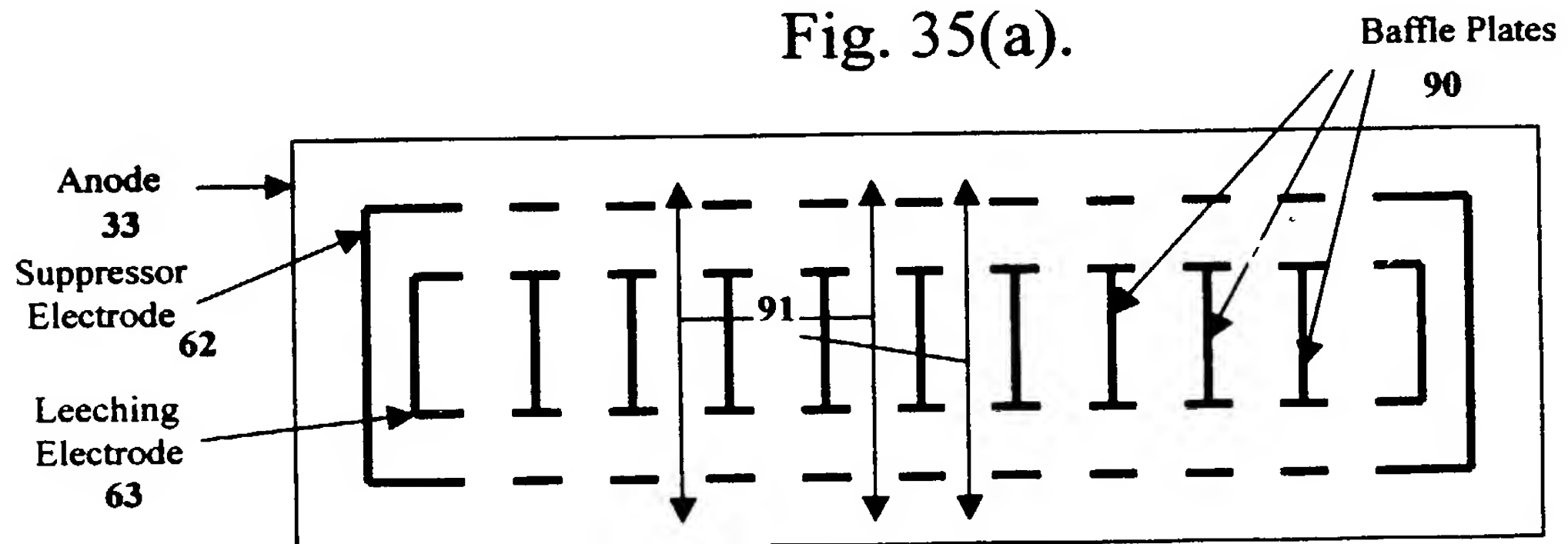


Fig. 35(b).

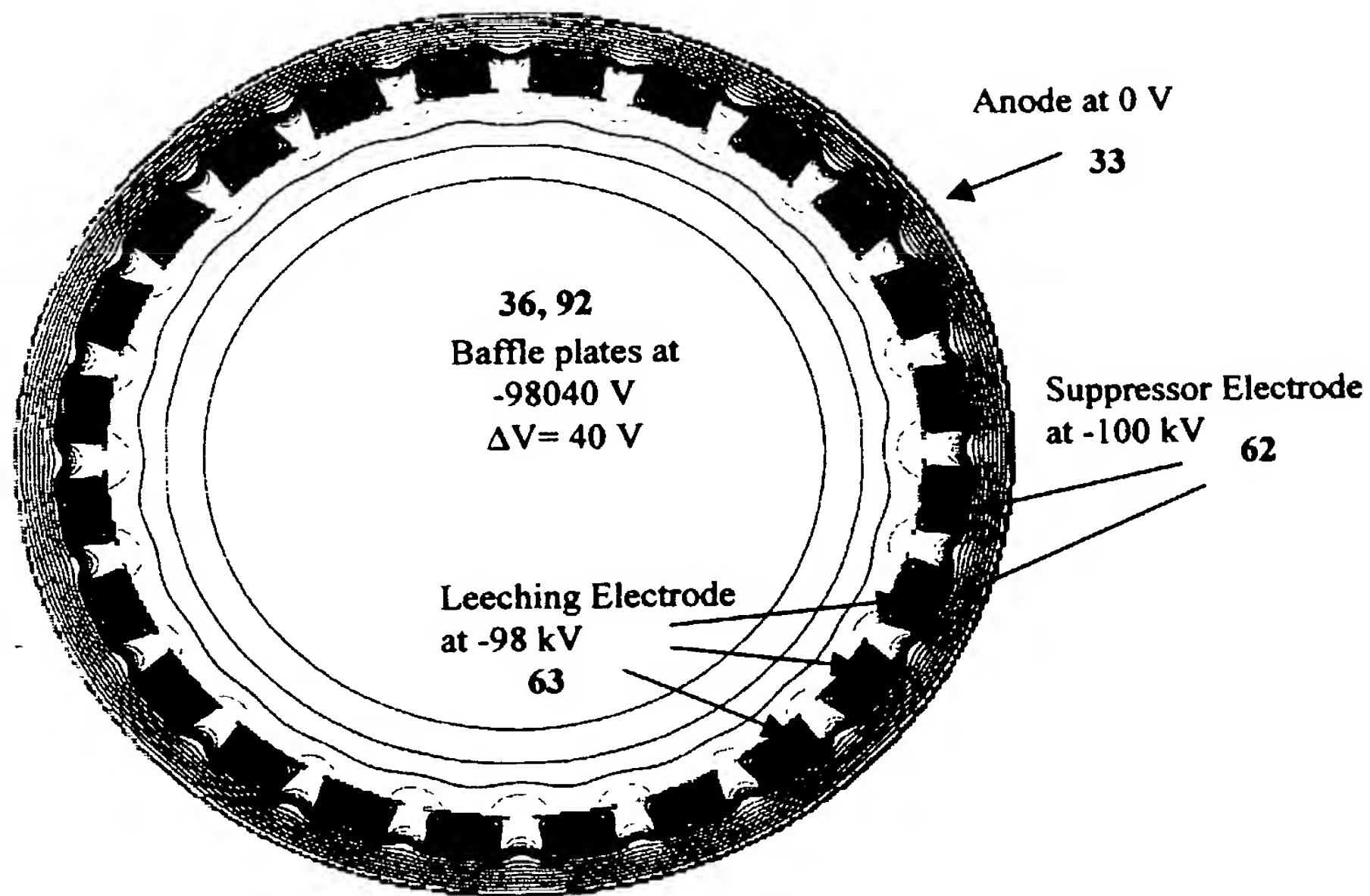


Figure 36.

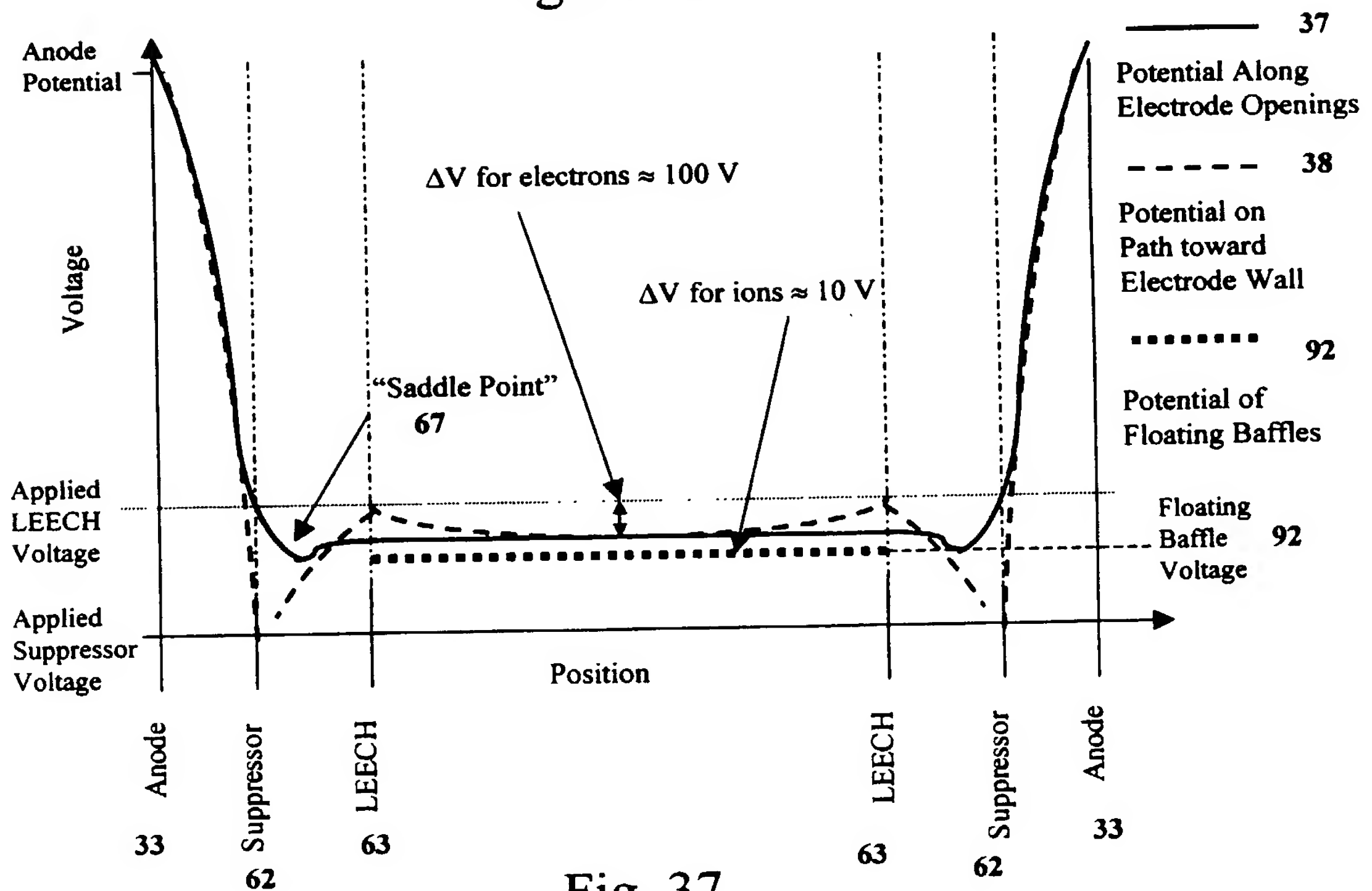


Fig. 37.

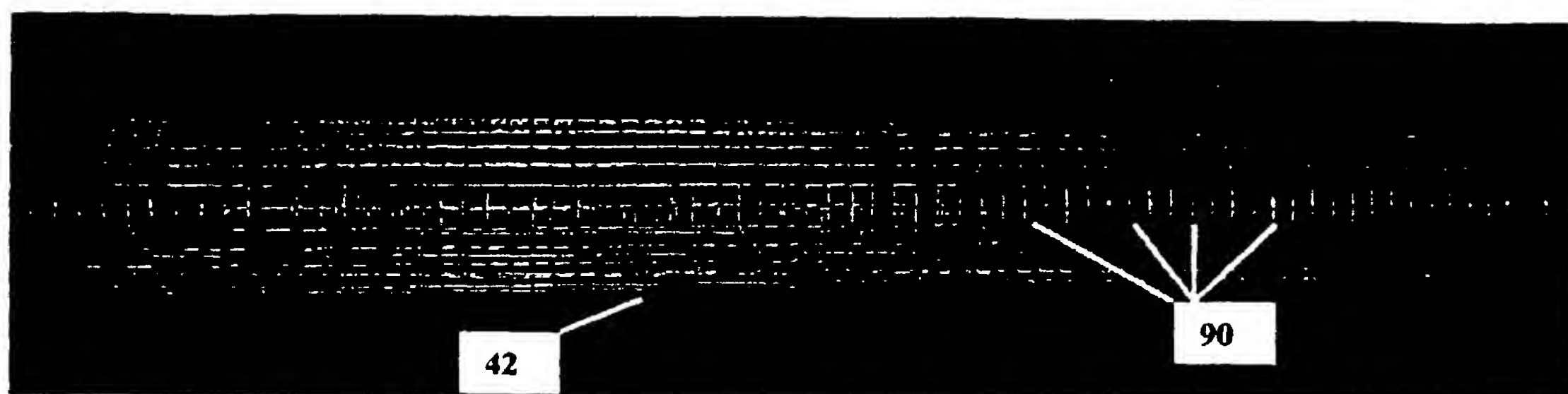


Fig. 38.



Fig. 39.

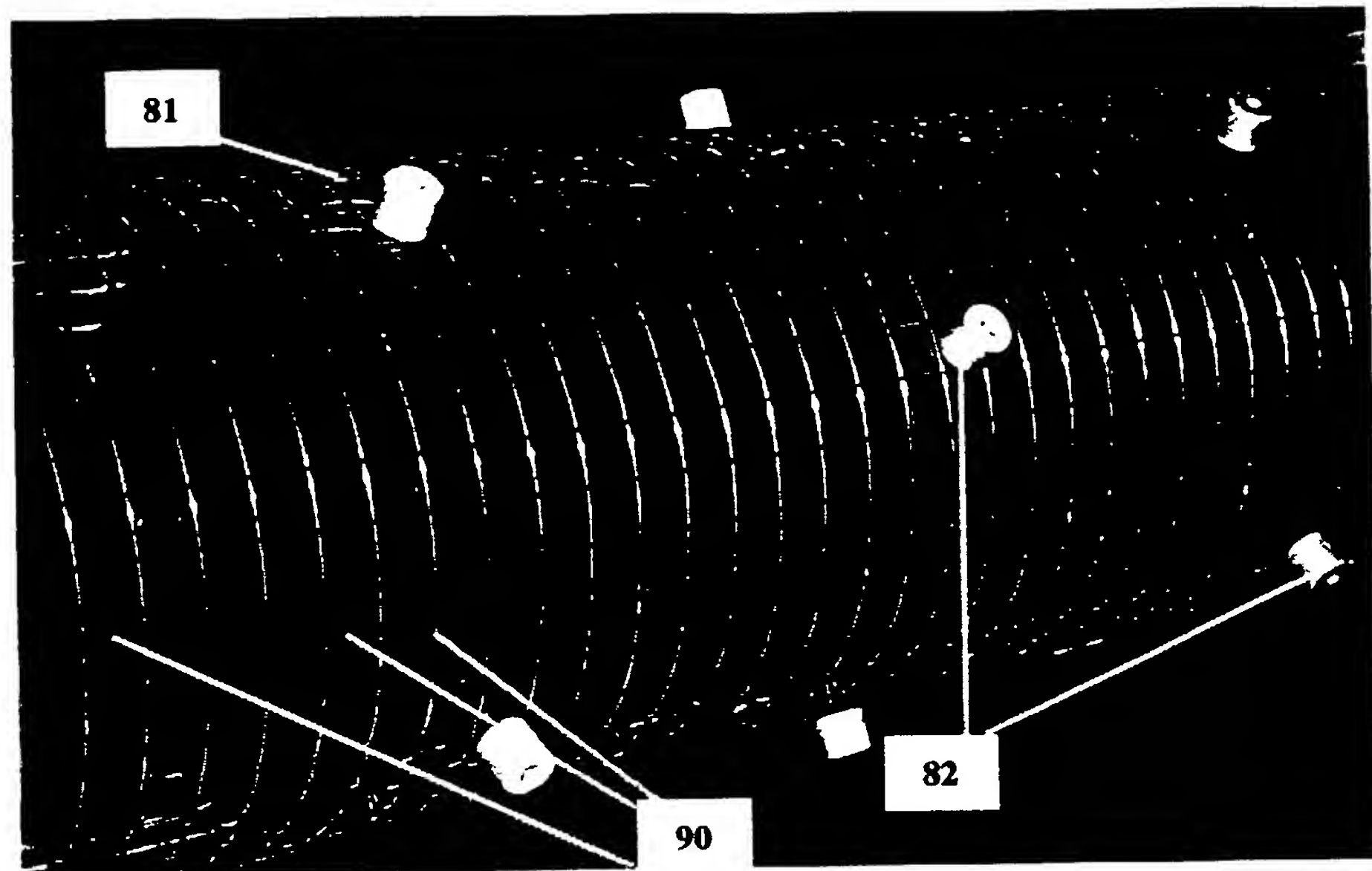
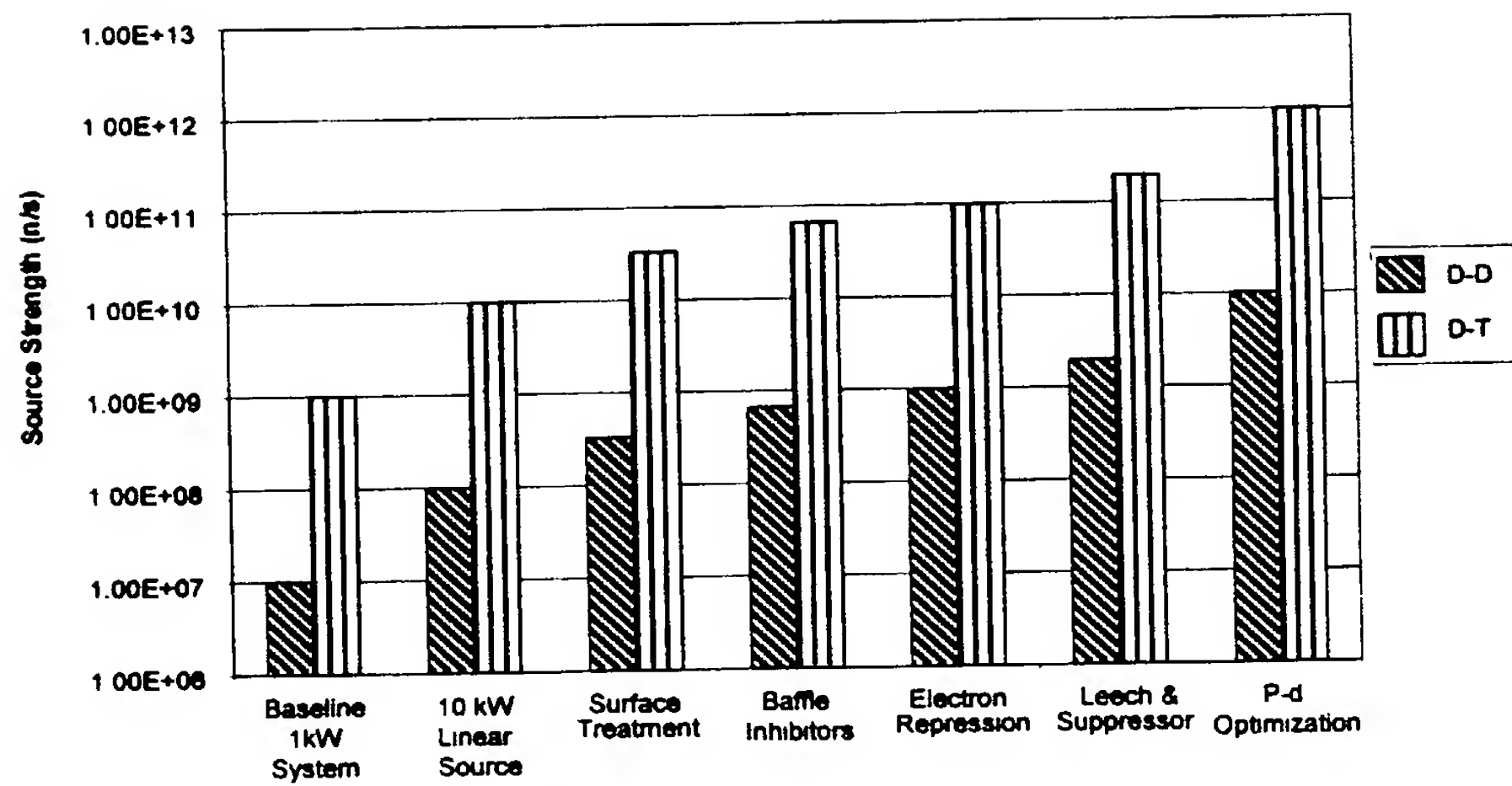


Fig. 40.



Technical Innovations

Fig. 41.

10/058,561 - 06/14/02

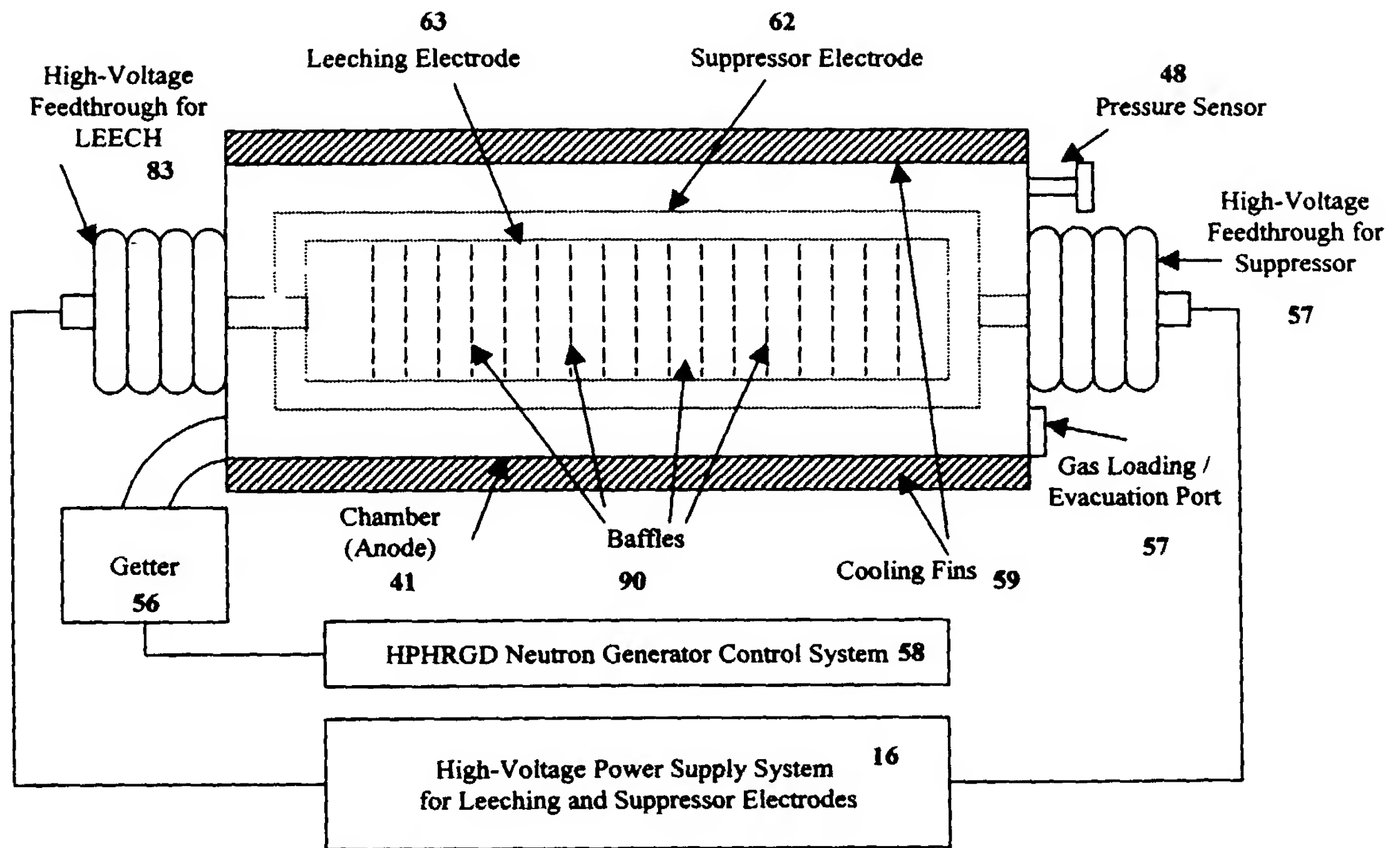


Fig. 42.

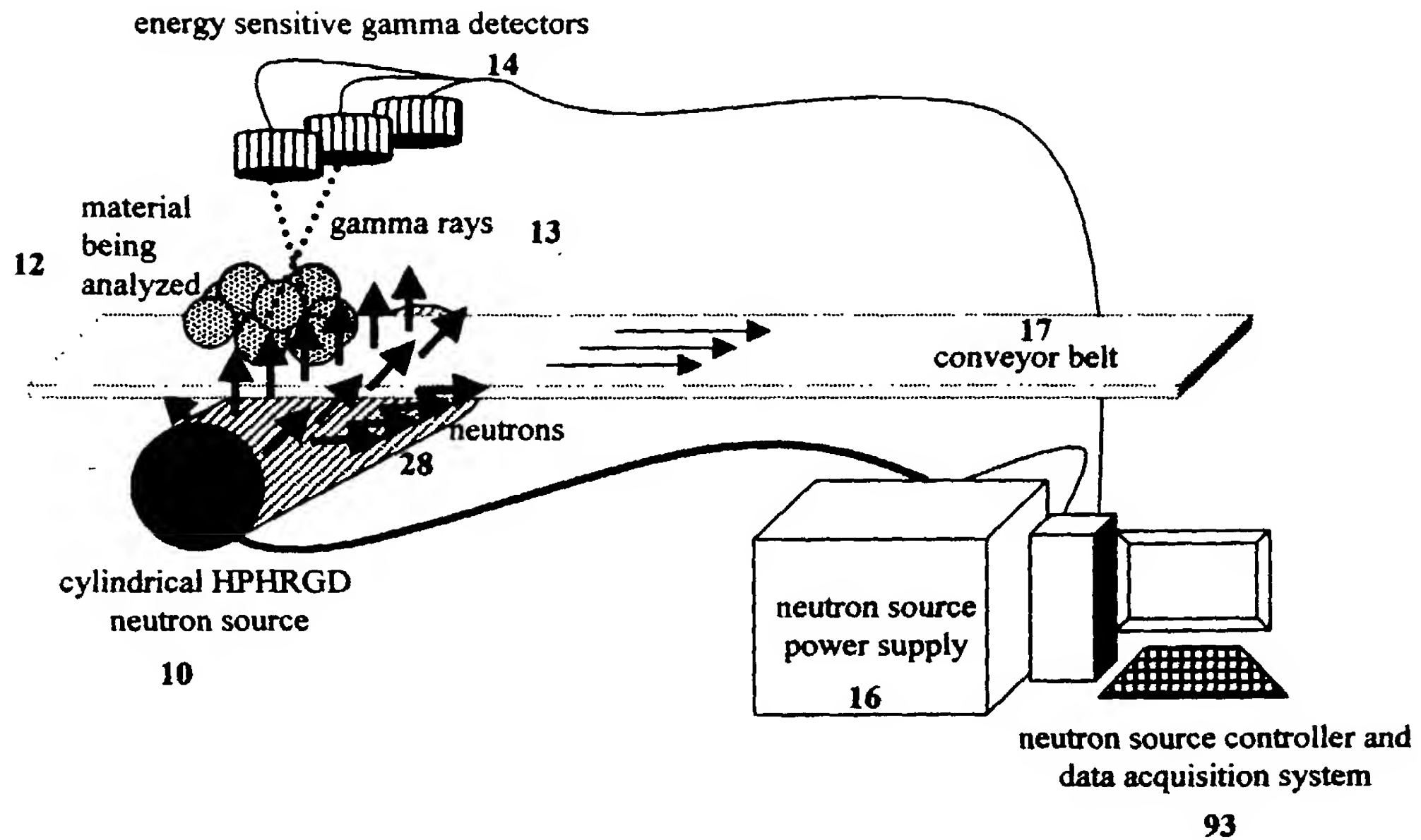


Fig. 43.

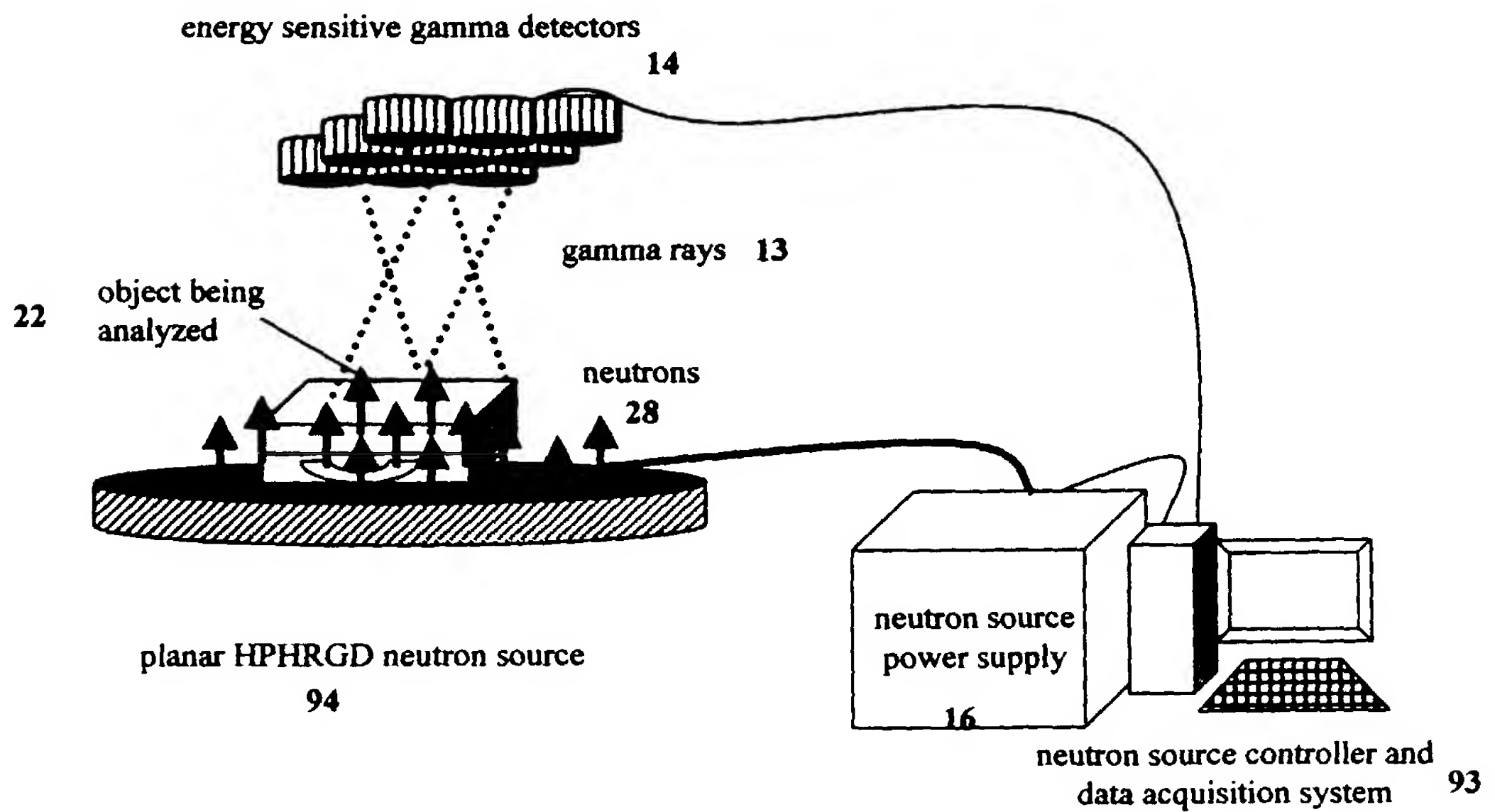


Fig. 44.

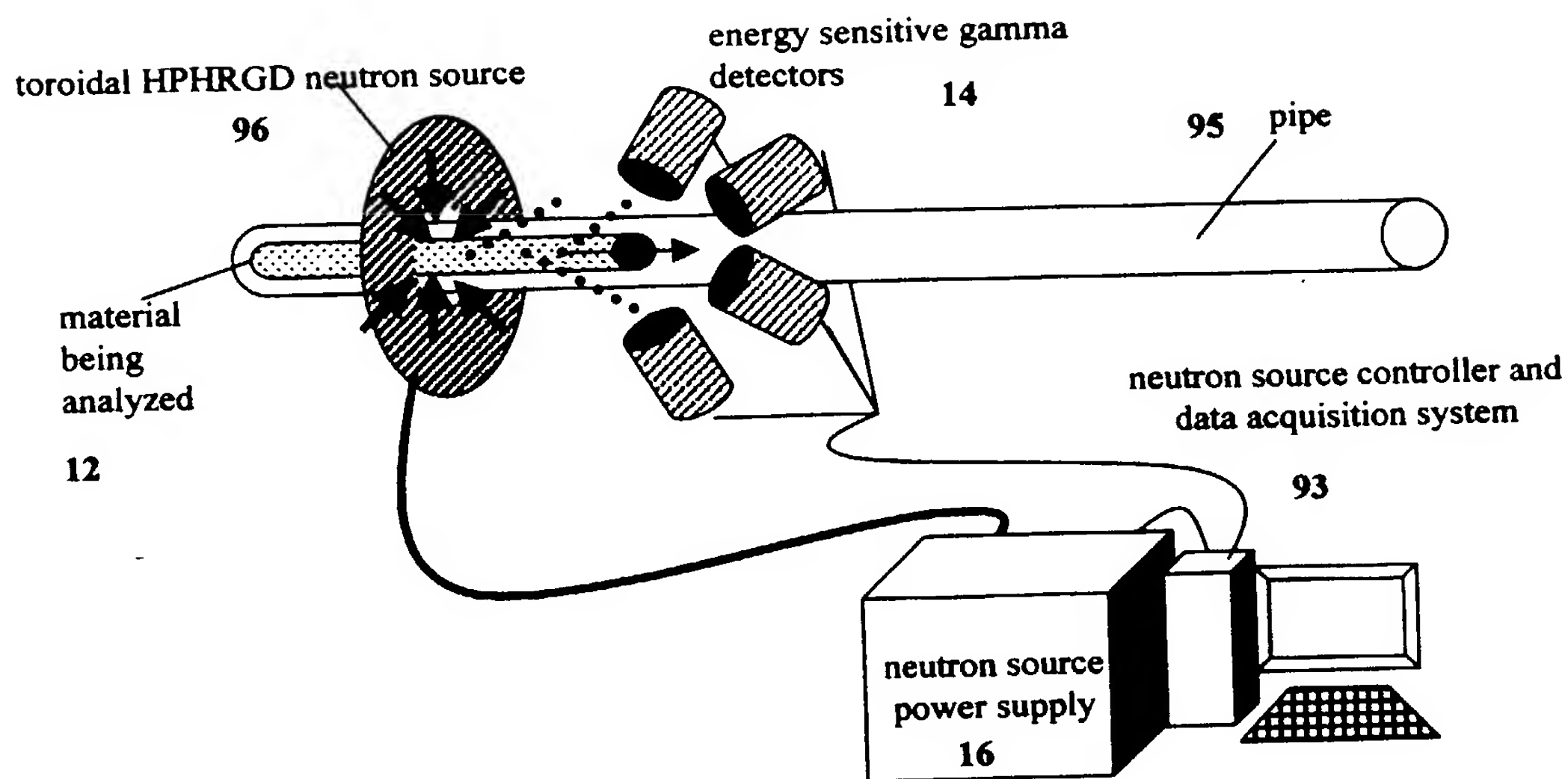


Fig. 45.

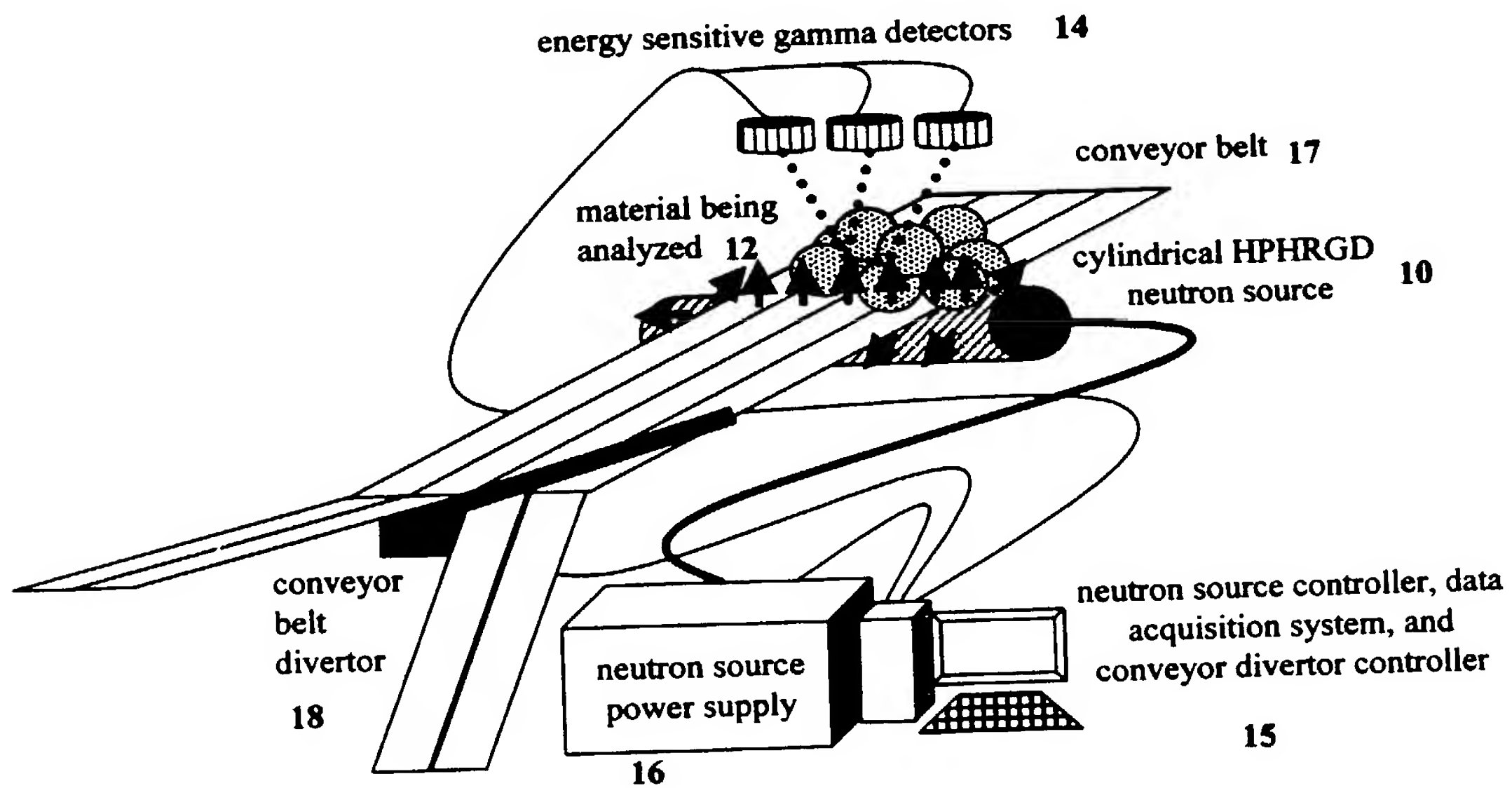
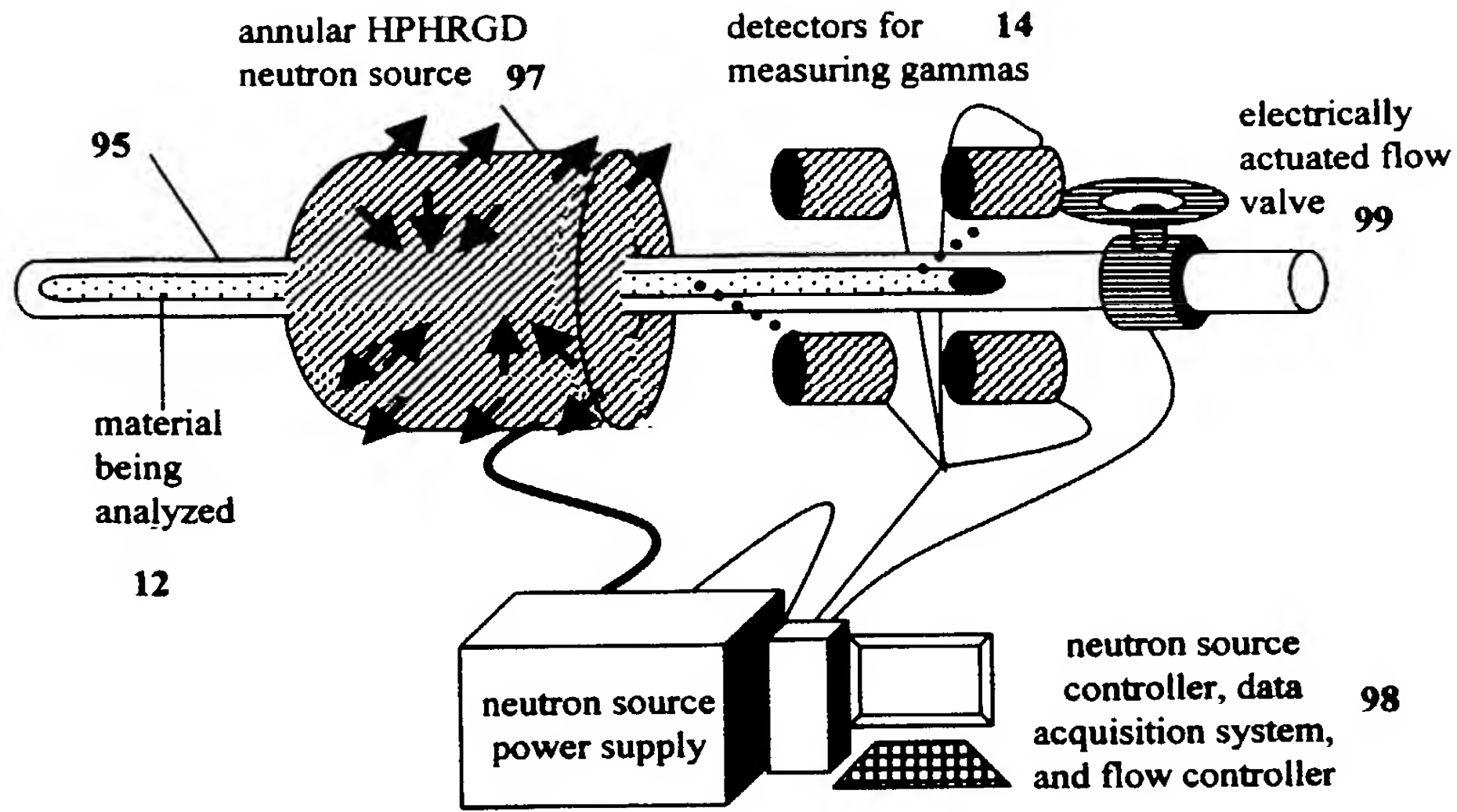


Fig. 46.



16
Fig. 47.

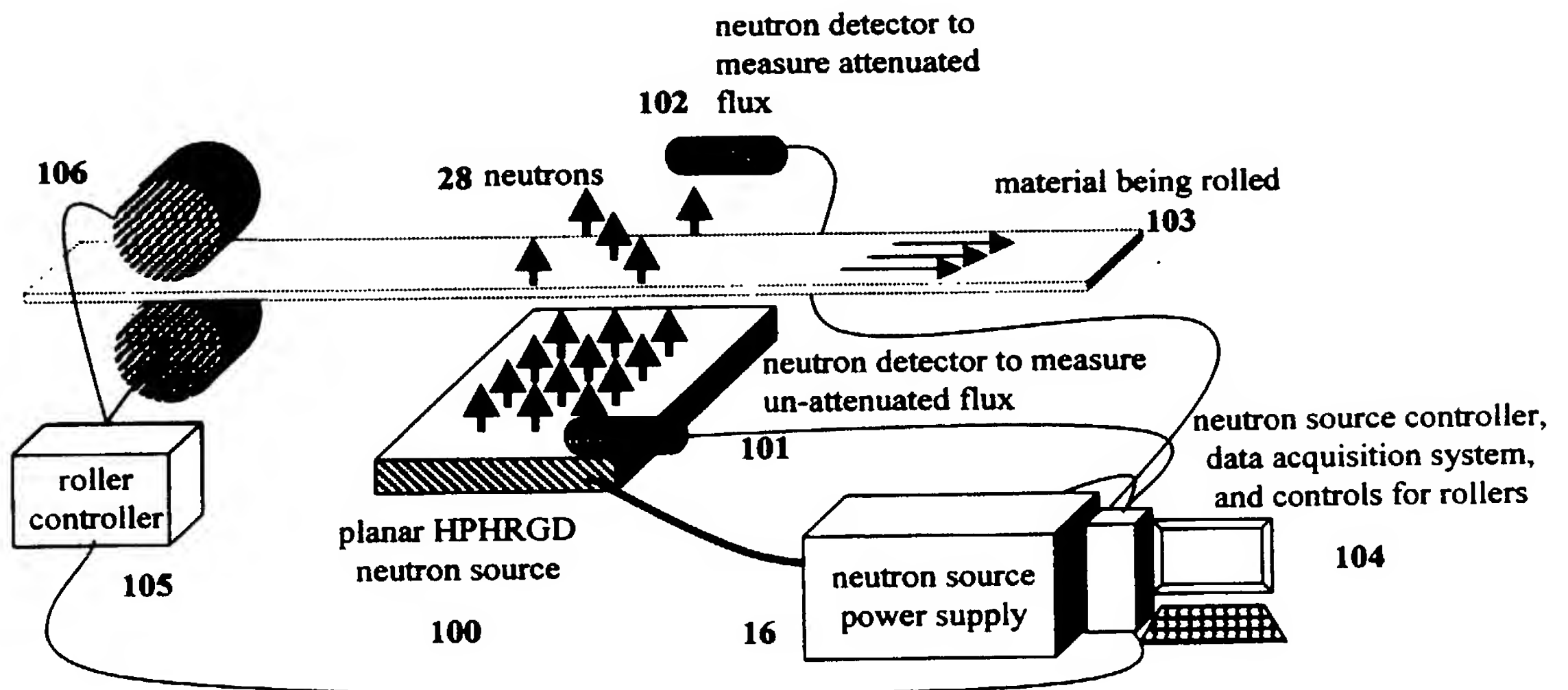


Fig. 48.

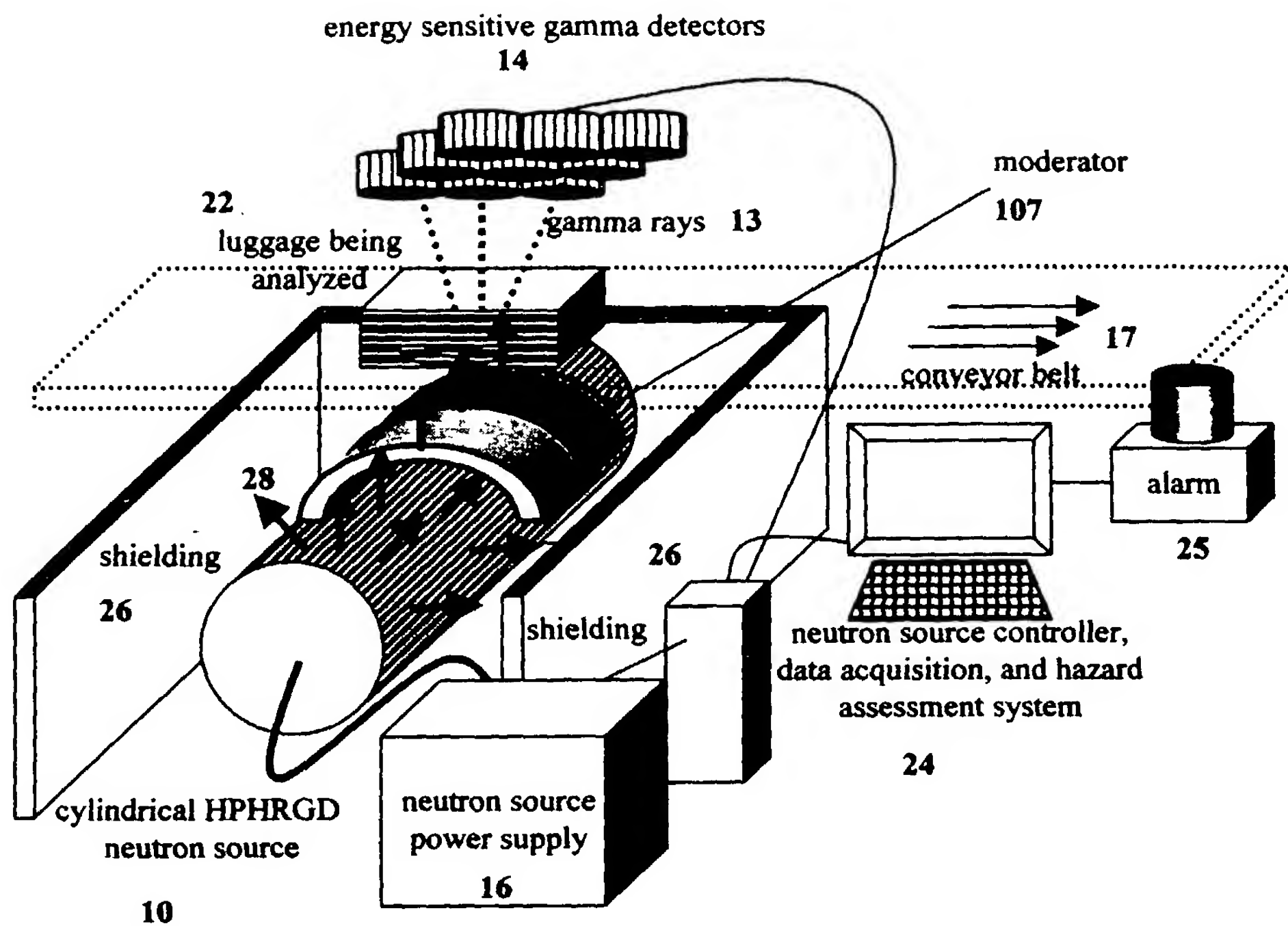


Fig. 49.

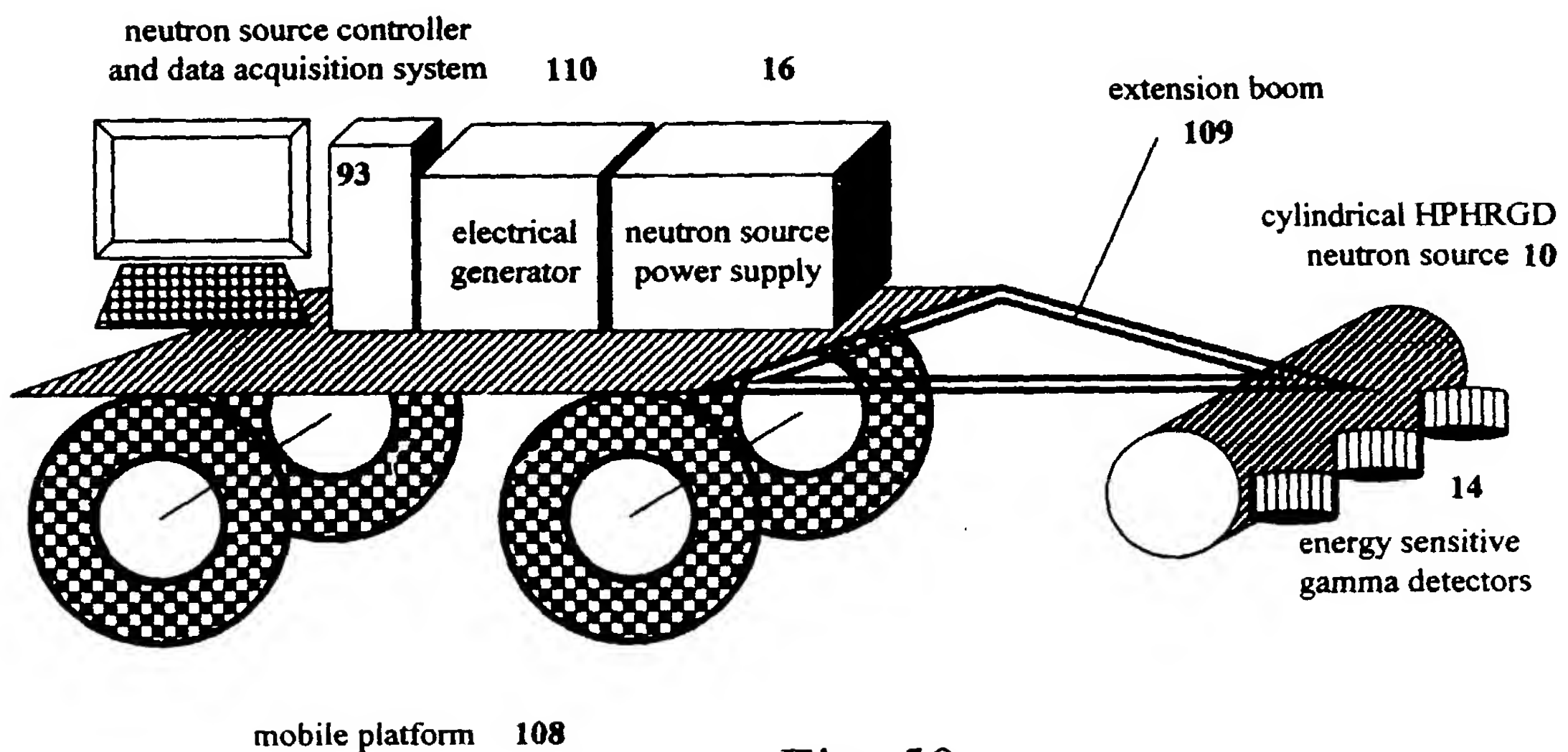


Fig. 50.

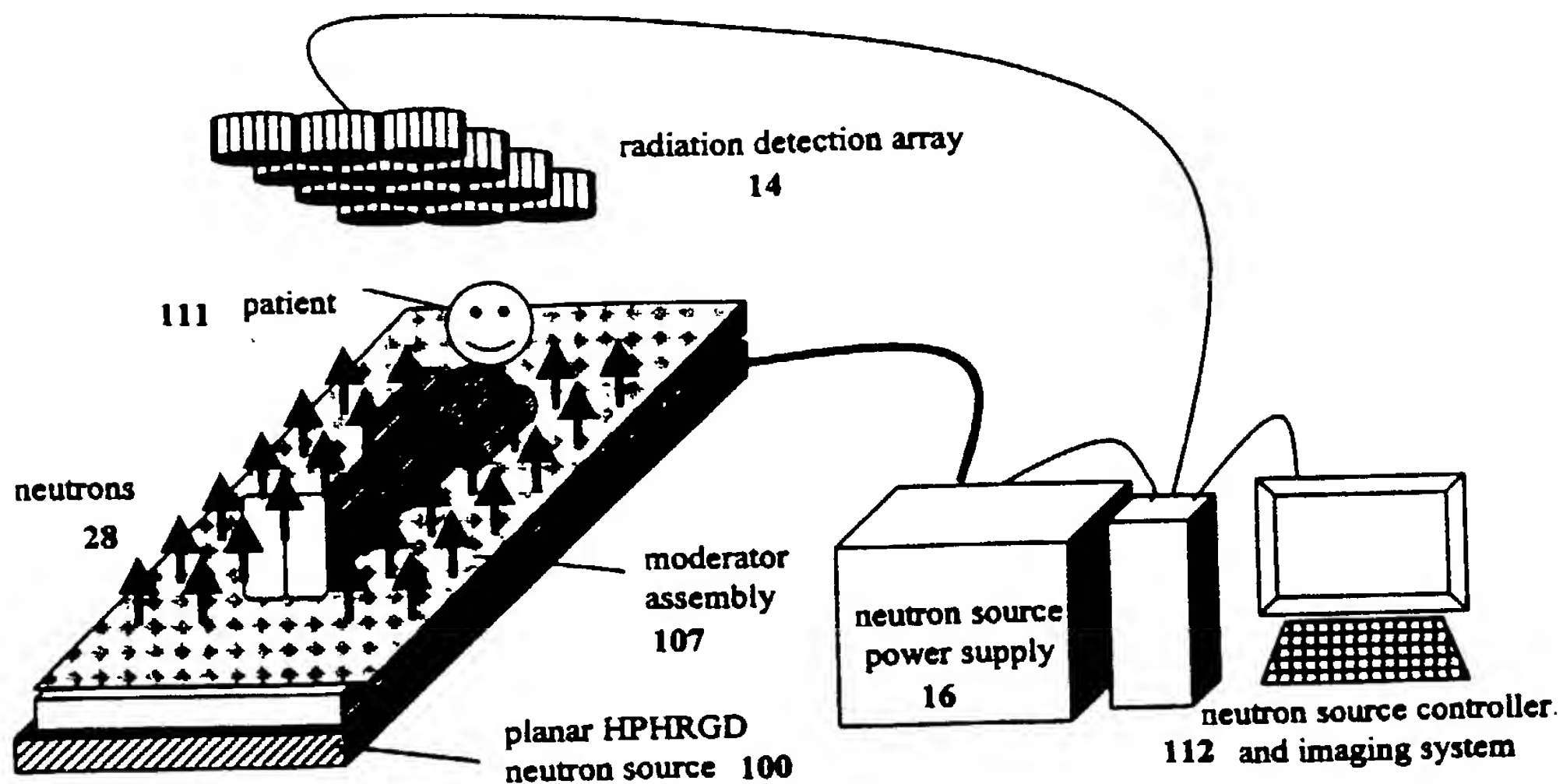


Figure 51.

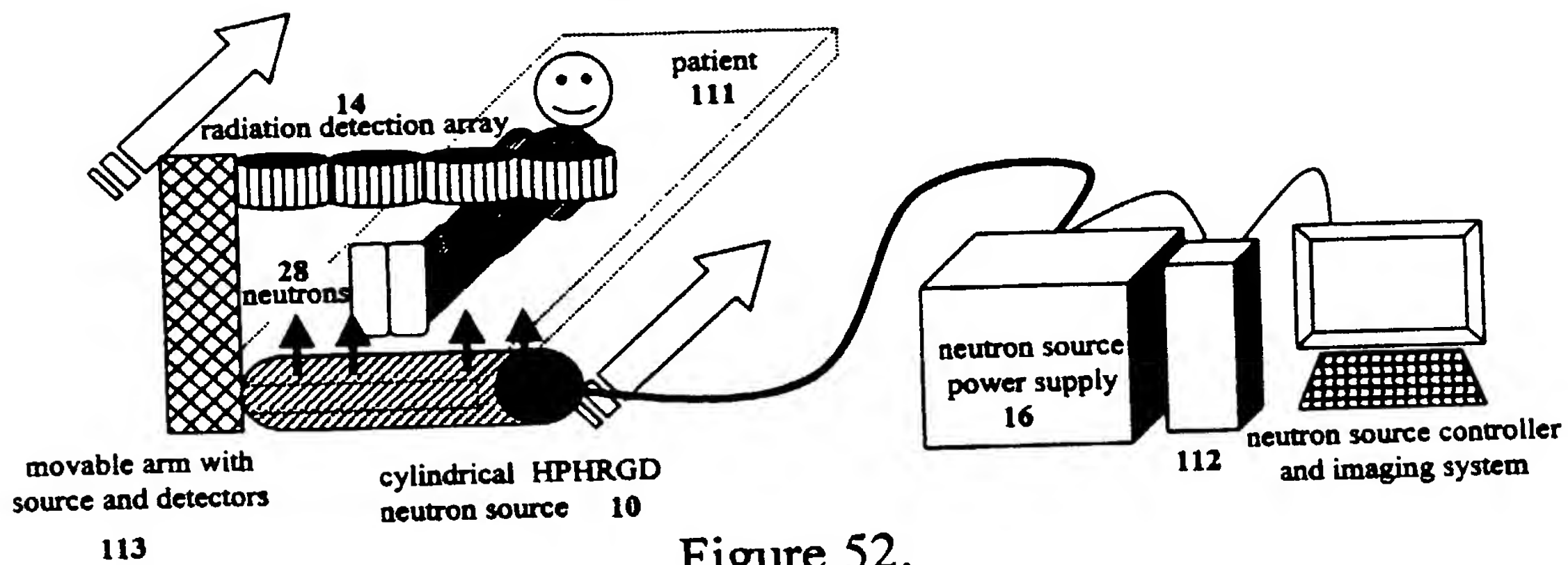


Figure 52.

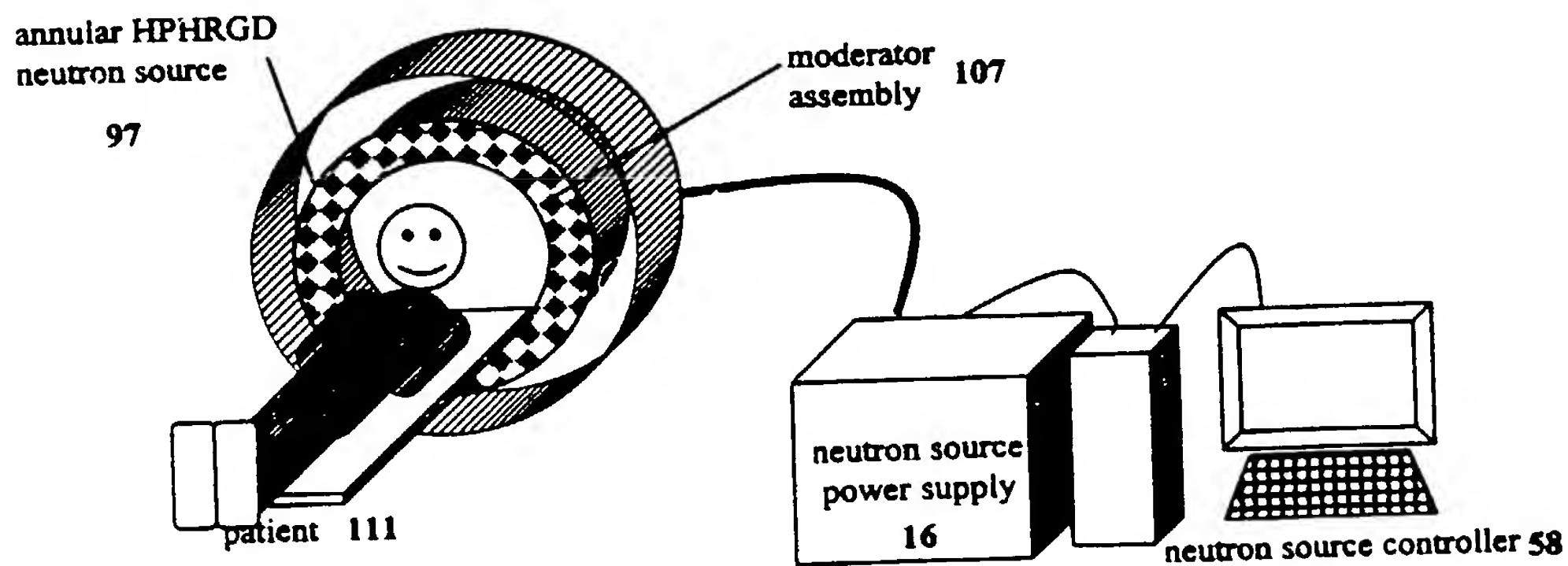


Figure 53.

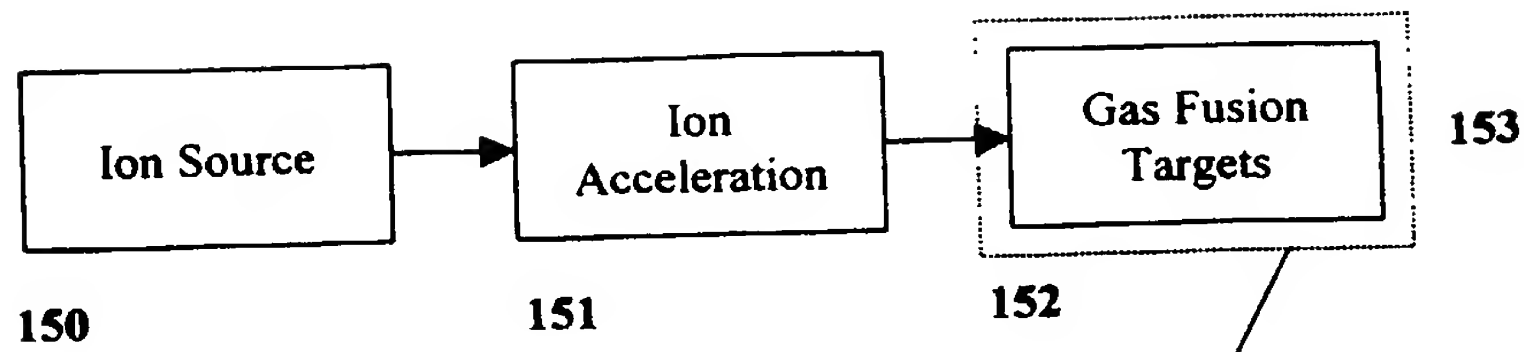


Fig. 54 (a). Electron Management System

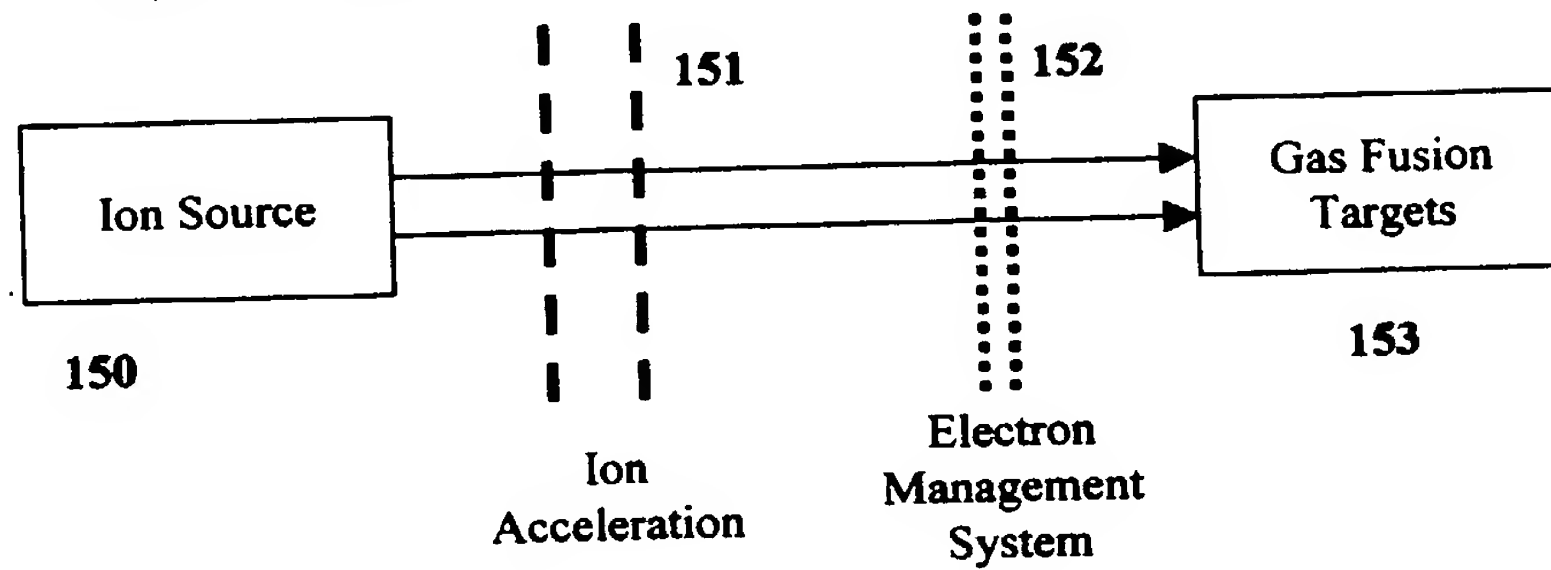


Fig. 54 (b).

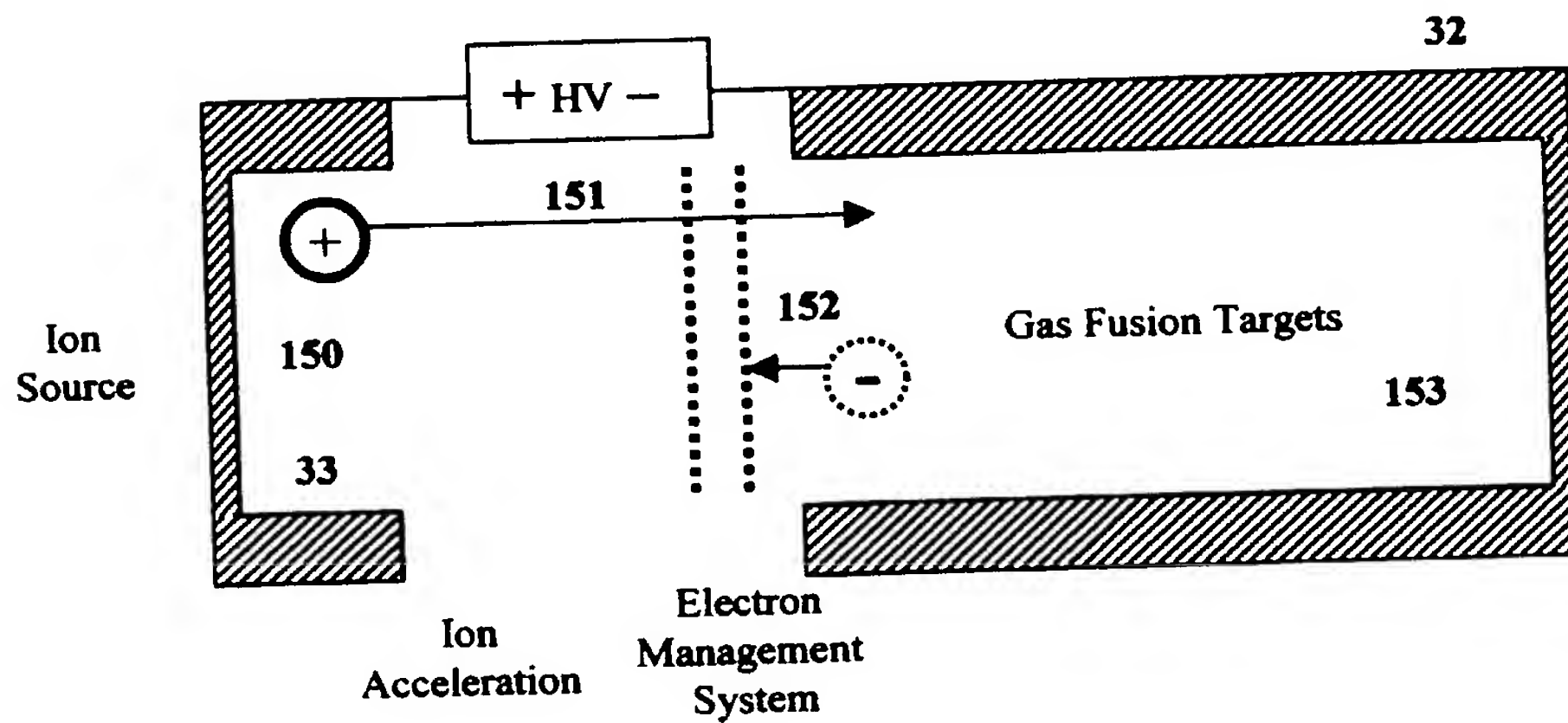


Fig. 55 (a).

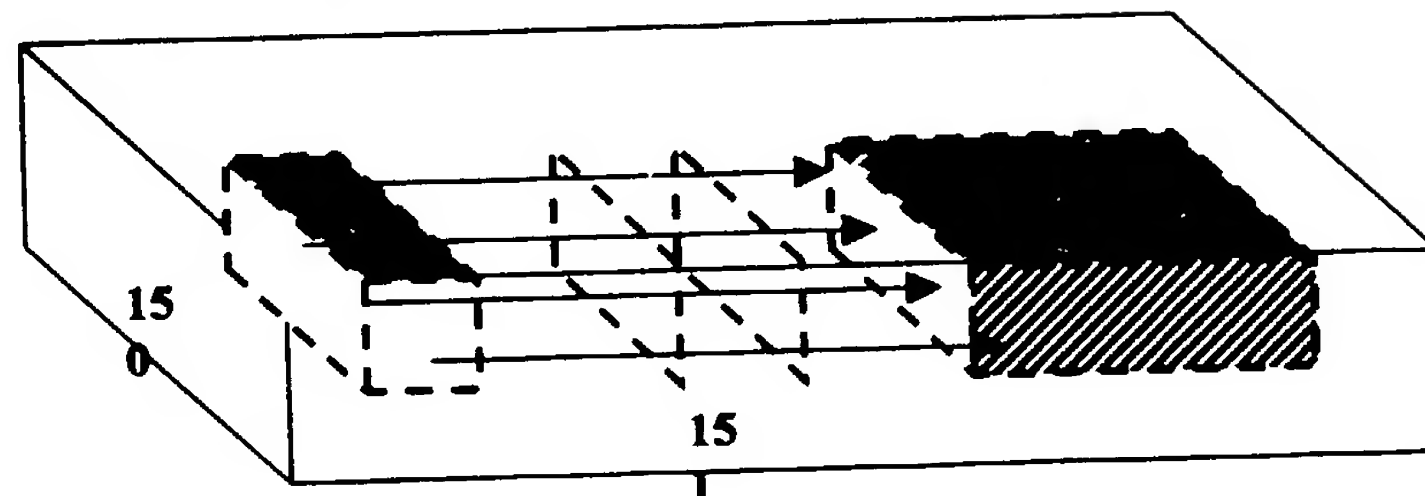
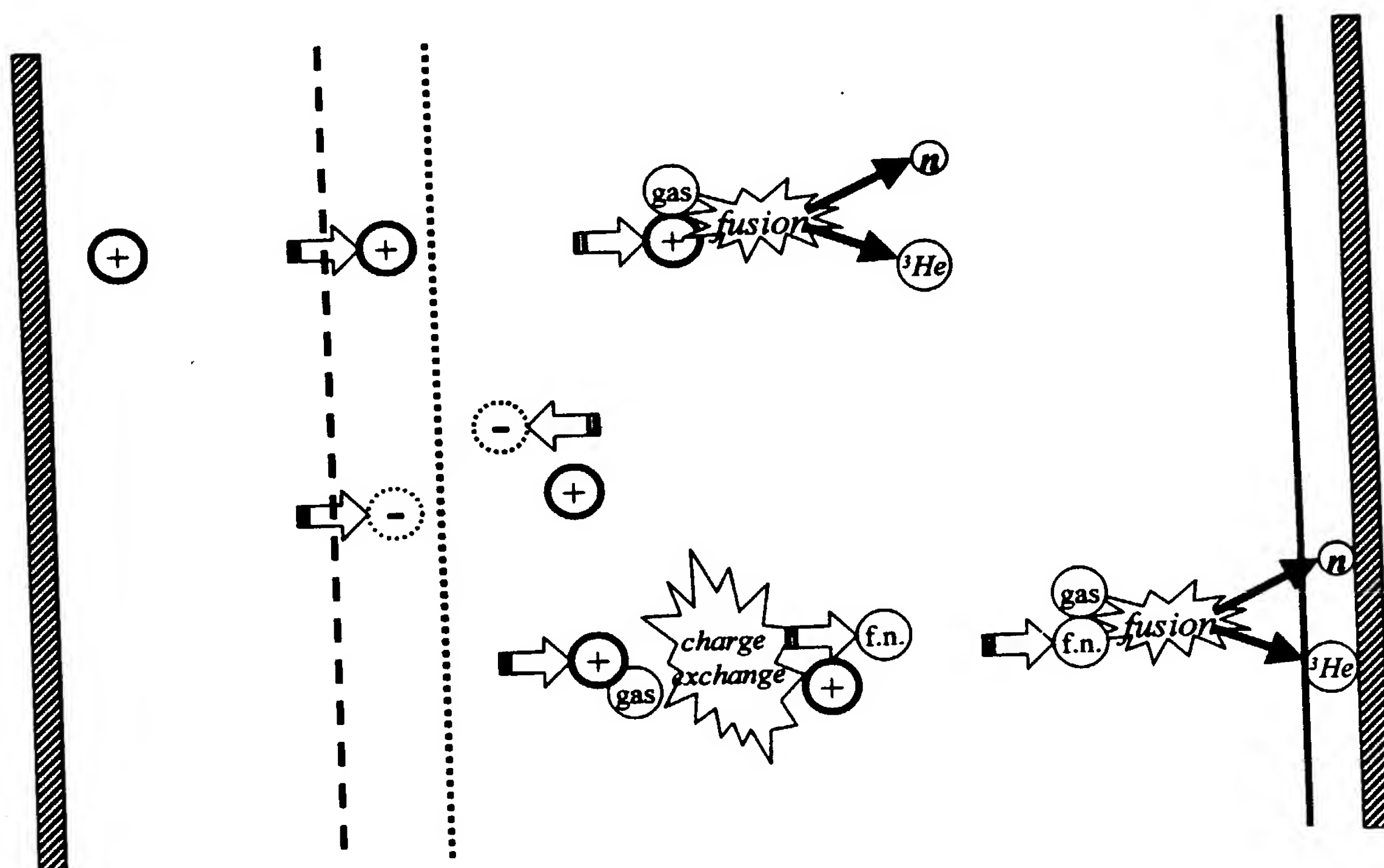
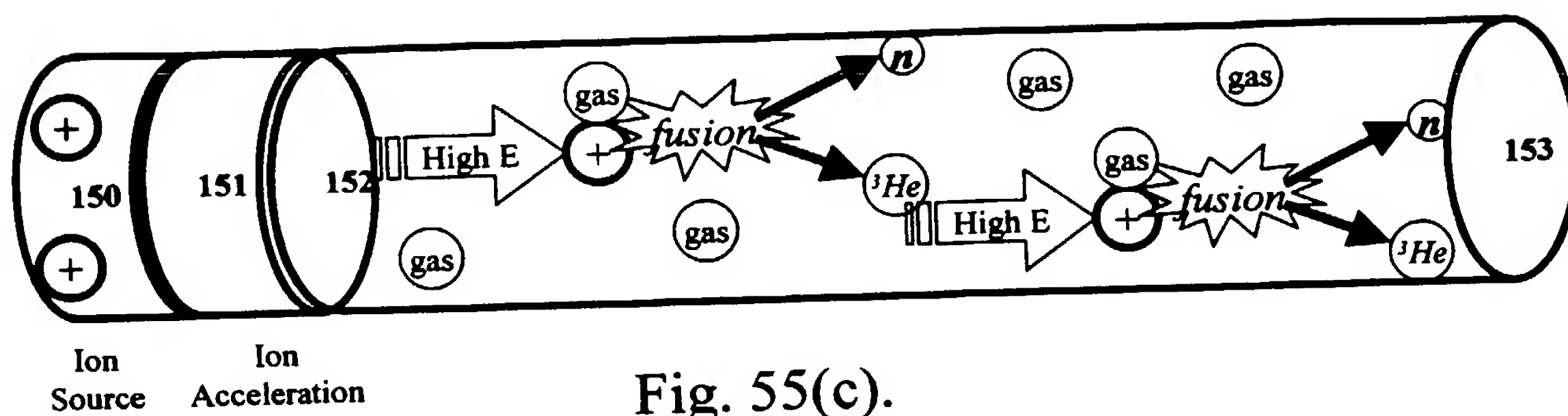


Fig. 55 (b).



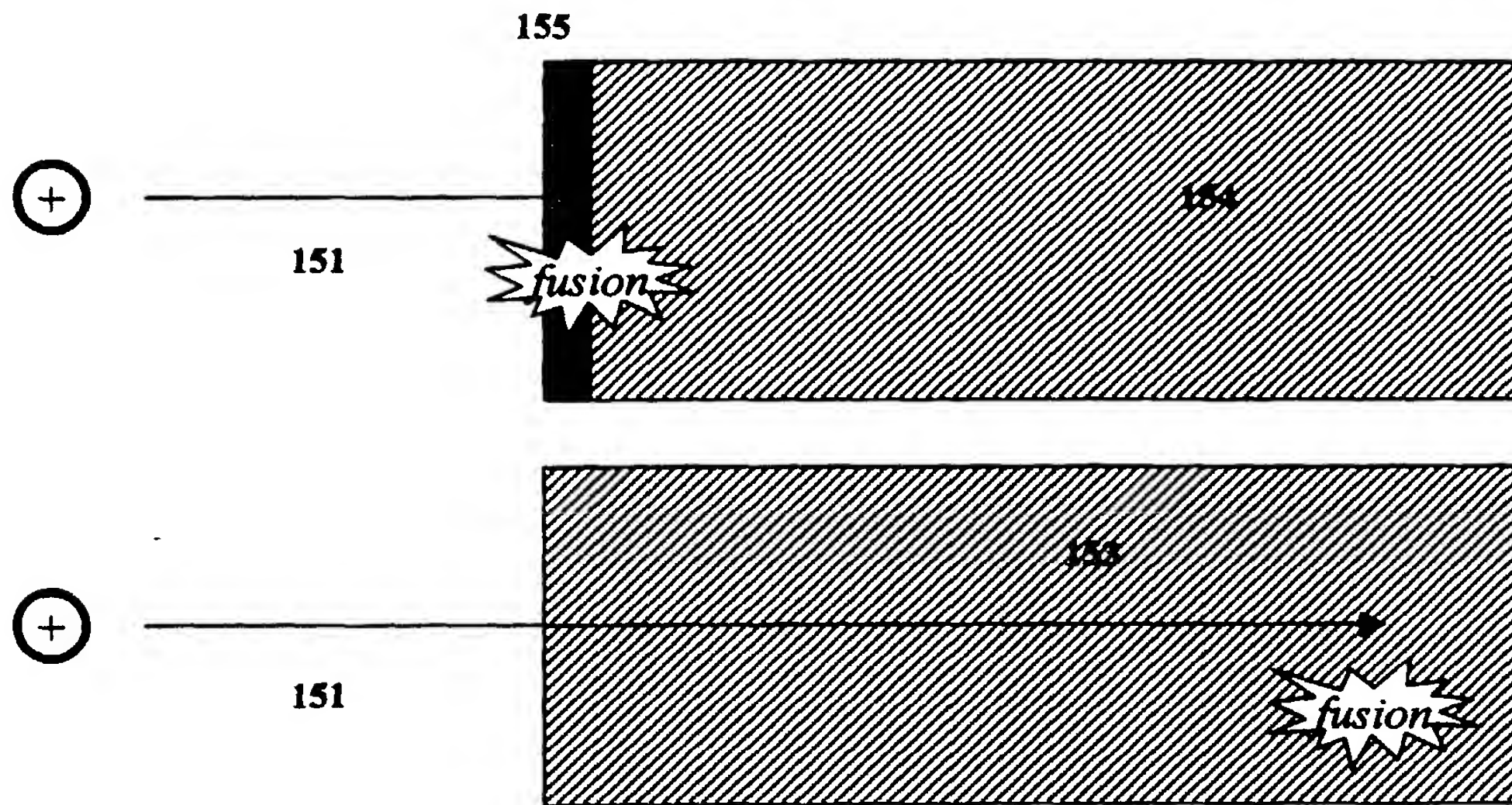


Fig. 57.

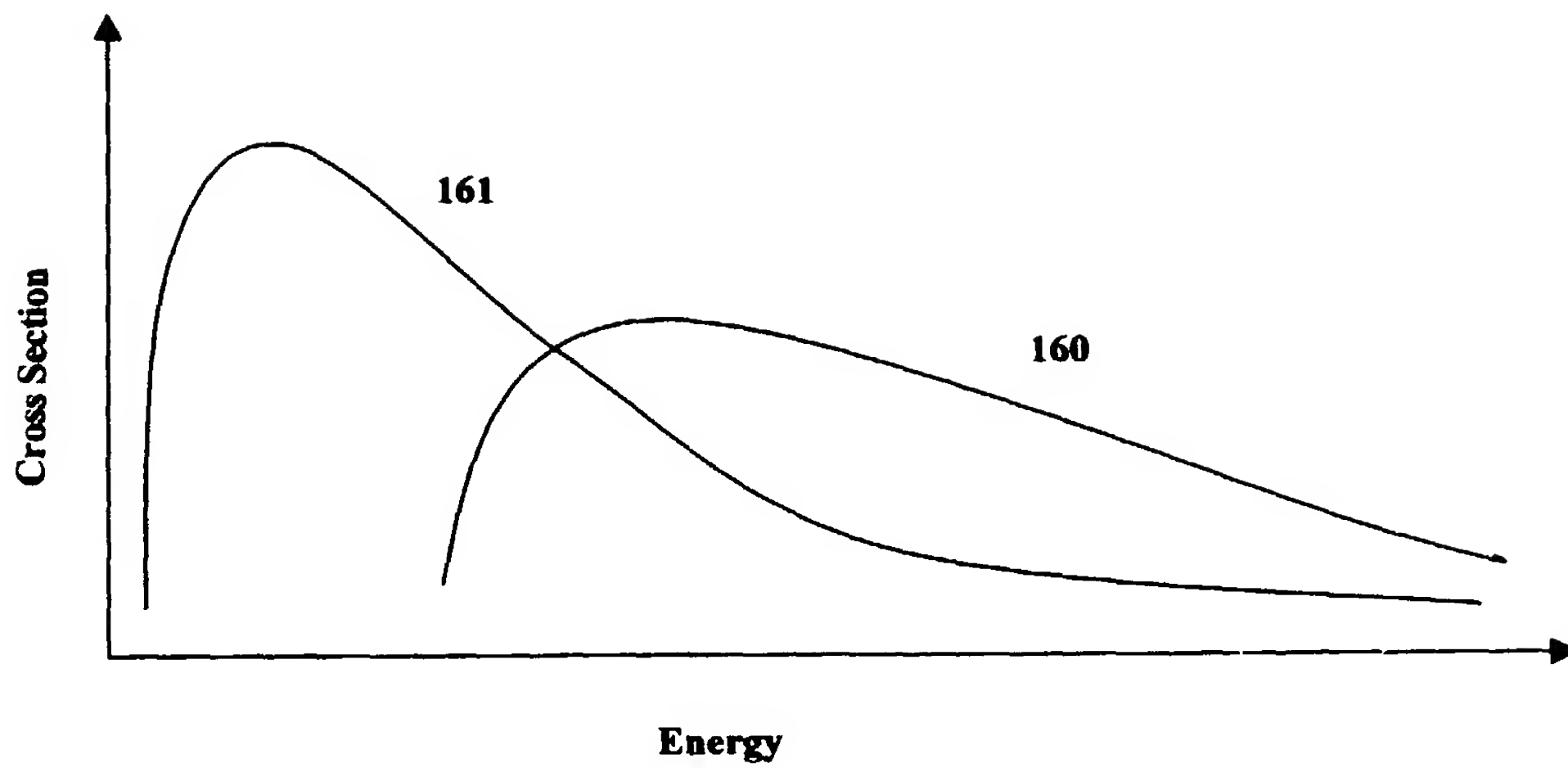


Fig. 58.

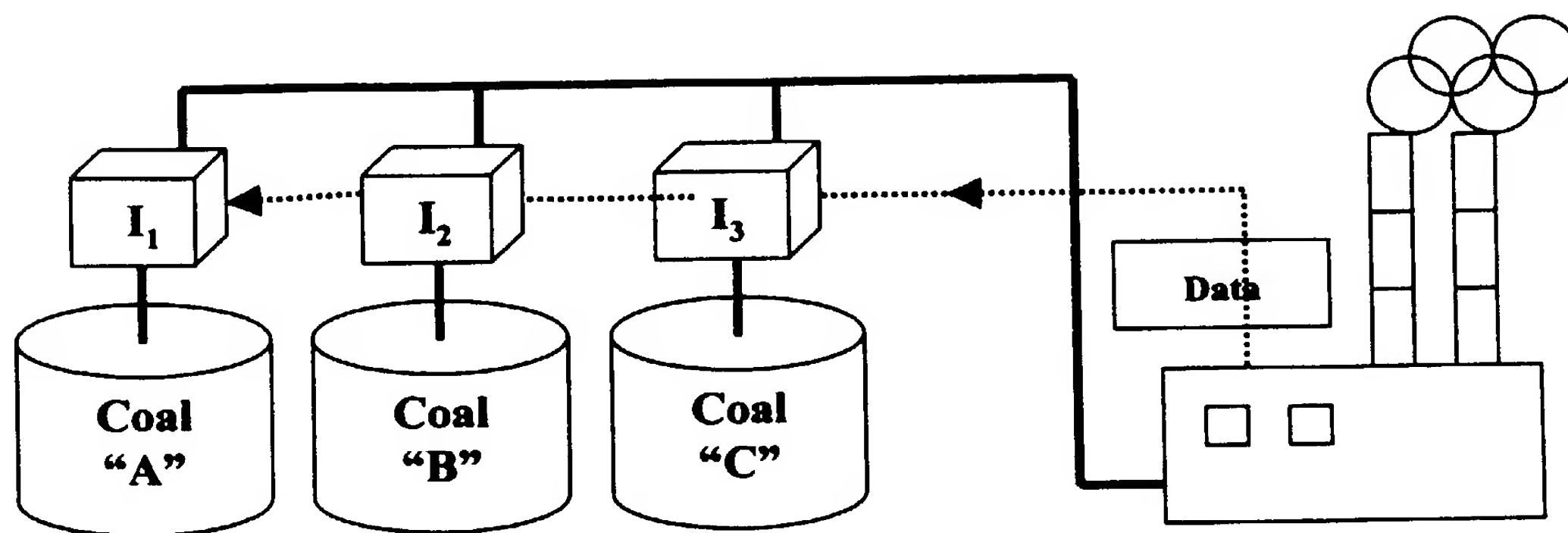


Fig. 59.